050-200266

TOSHIBA

SERVICE MANUAL

COLOUR TELEVISION

28N33B

AK37 Chassis

PRINTED IN UK. 2003 ©

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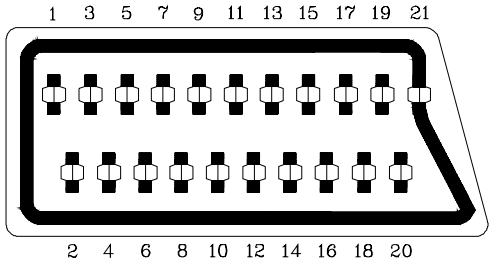
DO NOT CHANGE ANY MODULE UNLESS THE SET IS SWITCH OFF
The mains supply side of the switch mode power supply transformer is live.
Use an isolating transformer.
The receivers fulfill completely the safety requirements.

Safety precautions:
Servicing of this TV should only be carried out by a qualified person. Components marked with the warning symbol on the circuit diagram are critical for safety and must only be replaced with an identical component.
- Power resistor and fusable resistors must be mounted in an identical manner to the original component.

TV Set switched off:
Make short-circuit between HV-CRT clip and CRT ground layer.
Short C809 before changing IC800 end IC801 or other components in primary side of SMPS part.

Measurements:
Voltage readings and oscilloscope traces are measured under following conditions.
Antenna signal's level is 60dB at the color bar pattern from the TV pattern generator.(100% white,75% colour saturation)
Brightness, contrast, and color are adjusted for normal picture perfomance.
Mains supply, 220VAC, 50Hz.

PERI-TV SOCKET



SCART 1 PINING

1	Audio right output	0.5Vrms / 1K
2	Audio right input	0.5Vrms / 10K
3	Audio left output	0.5Vrms / 1K
4	Ground AF	
5	Ground Blue	
6	Audio left input	0.5Vrms / 10K
7	Blue input	0.7Vpp / 75ohm
8	AV switching input	0-12VDC /10K
9	Ground Green	
10	-	
11	Green input	0.7Vpp / 75ohm
12	-	
13	Ground Red	
14	Ground Blanking	
15	Red input	0.7Vpp / 75ohm
16	Blanking input	0-0.4VDC, 1-3VDC / 75ohm
17	Ground CVBS output	
18	Ground CVBS input	
19	CVBS output	1Vpp / 75ohm
20	CVBS input	1Vpp / 75ohm
21	Ground	

SCART 2 PINING

1	Audio right output	0.5Vrms / 1K
2	Audio right input	0.5Vrms / 10K
3	Audio left output	0.5Vrms / 1K
4	Ground AF	
5	Ground Blue	
6	Audio left input	0.5Vrms / 10K
7	Blue input	
8	AV switching input	0-12VDC /10K
9	Ground Green	
10	-	
11	-	
12	-	
13	Ground Red	
14	Ground Blanking	
15	-	
16	-	
17	Ground CVBS output	
18	Ground CVBS input	
19	CVBS output	1Vpp / 75ohm
20	CVBS input	1Vpp / 75ohm
21	Ground	

1. INTRODUCTION

11AK37 is a 110° chassis capable of driving 25", 28", 29", 33" 4:3 and 28", 32" 16:9 tubes at the appropriate currents. The chassis is capable of operating in PAL, SECAM and NTSC standards and multiple transmission standards as B/G, D/K, I/I', and L/L´. standards. The sound system is capable of giving 12 watts RMS output into a load of 8 ohms.
One page, 7 page SIMPLETEXT, TOPTEXT, FASTTEXT and US Closed Caption is also provided. The chassis is equipped with a double-deck 42 pin scart connector for AV input/output, front-AV input, one back-AV output, one SVHS, one headphone and one subwoofer.

2. SMALL SIGNAL PART WITH STV2248:

STV2248 video processor is essential for realizing all small signal functions for a color TV receiver.

2.1 Vision IF amplifier

The vision IF amplifier can demodulate signals with positive and negative modulation. The PLL demodulator is completely alignment-free. Although the VCO (Toko-coil) of the PLL circuit is external, yet the frequency is fixed to the required value by the original manufacturer thus the Toko-coil does not need to be adjusted manually. The setting of the various frequencies (38.9 or 45.75 MHz) can be made via changing the coil itself

2.2 QSS Sound circuit (QSS versions)

The sound IF amplifier is similar to the vision IF amplifier and has an external AGC de-coupling capacitor. The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the inter-carrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved. The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output via the volume control.

The AM demodulated signal results from multiplying the input signal by itself, it is available on AM/FM output.

2.3 FM demodulator and audio amplifier (mono versions):

The FM demodulator is realized as narrow-band PLL with external loop filter, which provides the necessary selectivity without using an external band-pass filter. To obtain a good selectivity a linear phase detector and constant input signal amplitude are required. For this reason the inter-carrier signal is internally supplied to the demodulator via a gain controlled amplifier and AGC circuit. The nominal frequency of the demodulator is tuned to the required frequency (4.5/5.5/6.0/6.5 MHz) by means of a calibration circuit that uses the clock frequency of the µ-controller/Teletext decoder as a reference. The setting to the wanted frequency is realized by means of the software. It can be read whether the PLL frequency is inside or outside the window and whether the PLL is in lock or not. With this information it is possible to make an automatic search system for the incoming sound frequency. This is realized by means of a software loop that alternate the demodulator to various frequencies, then select the frequency on which a lock condition has been found. De-emphasis output signal amplitude is independent of the TV standard and has the same value for a frequency deviation of ±25 kHz at the 4.5 MHz standard and for a deviation of ±50 kHz for the other standards. When the IF circuit is switched to positive modulation the internal signal on de-emphasis pin is automatically muted. The audio control circuit contains an audio switch and volume control. In the mono inter-carrier sound versions the Automatic Volume Leveling (AVL) function can be activated. The pin to which the external capacitor has to be connected depends on the IC version.

2.4 Video switching

The video processor (STV2248C) has three CVBS inputs and two RGB inputs. The first CVBS input is used for external CVBS from SCART 1, the second is used for either CVBS or Y/C from either SCART2 or BAV/FAV or SVHS, and the third one is used for internal video. The selection between both external video inputs signals is realized by means of software and hardware switches.

2.5 Synchronization circuit

The video processor (STV224X) performs the horizontal and vertical processing. The external horizontal deflection circuit is controlled via the Horizontal output pulse (HOUT). The vertical scanning is performed through an external ramp generator and a vertical power amplifier IC controlled by the Vertical output pulse (VOUT).

The main components of the deflection circuit are:

- PLL1: the first phase locked loop that locks the internal line frequency reference on the CVBS input signal. It is composed of an integrated VCO (12 MHz) that requires the chroma reference frequency (4.43MHz or 3.58MHz crystal oscillator reference signal), a divider by 768, a line decoder, and a phase comparator.
- PLL2: The second phase locked loop that controls the phase of the horizontal output (Compensation of horizontal deflection transistor storage time variation). Also the horizontal position adjustment is also performed in PLL2.
- A vertical pulse extractor.
- A vertical countdown system to generate all vertical windows (vertical synchronization window, frame blanking pulses, 50/60Hz identification window...).
- Automatic identification of 50/60Hz scanning.
- PLL1 time constant control.
- Noise detector, video identification circuits, and horizontal coincidence detector.
- Vertical output stage including de-interlace function, vertical position control.
- Vertical amplitude control voltage output (combined with chroma reference output and Xtal 1 indication).

2.6 Chroma and luminance processing:

The chroma decoder is able to demodulate PAL, NTSC and SECAM signals.
The decoder dedicated to PAL and NTSC sub-carrier is based on a synchronous demodulator, and an Xtal PLL locked on the phase reference signal (burst).
The SECAM demodulation is based on a PLL with automatic calibration loop.
The color standard identification is based on the burst recognition.
Automatic and forced modes can be selected through the I ^{2}C bus.
NTSC tint, and auto flesh are controlled through I ^{2}C bus.
Xtal PLL can handle up to 3 crystals to work in PAL M, PAL N and NTSC M for South America.
ACC an ACC overload control the chroma sub-carrier amplitude within 26dB range. Both
ACC s are based on digital systems and do not need external capacitor.
All chroma filters are fully integrated and tuned via a PLL locked on Xtal VCO signal.
A second PLL is used for accurate fine-tuning of the SECAM bell filter. This tuning is achieved during the frame blanking.
An external capacitor memorizes the bell filter tuning voltage.
A base-band chroma delay-line rebuilds the missing color line in SECAM and removes transmission phase errors in PAL.
The base-band chroma delay line is clocked with 6MHz signal provided by the horizontal scanning VCO.
The luminance processor is composed of a chroma trap filter, a luminance delay line, a peaking function with noise coring feature, a black stretch circuit.
Trap filter and luminance delay lines are achieved with the use of bi-quad integrated filters, auto-aligned via a master filter phase locked loop.

2.7 RGB output circuit:

The video processor performs the R, G, B processing.
There are three sources:

1. Y,U,V inputs (coming from luma part (Y output), and chroma decoder outputs (R-Y, B-Y outputs).
2. External R,G,B inputs from SCART (converted internally in Y,U,V), with also the possibility to input YUV signals from a DVD player, (YUV specification is Y=0.7 V PP , U= 0.7 V PP , V = 0.7V PP for 100% color bar).
3. Internal R,G,B inputs (for OSD and Teletext display)

The main functions of the video part are:

- Y,U,V inputs with integrated clamp loop, allowing a DC link with YUV outputs,
- External RGB inputs (RGB to YUV conversion), or direct YUV inputs,
- Y,U,V switches,
- Contrast, saturation, brightness controls,
- YUV to RGB matrix,
- OSD RGB input stages (with contrast control),
- RGB switches,
- APR function,
- DC adjustment of red and green channels,
- Drive adjustments (R, G, B gain),
- Digital automatic cut-off loop control,
- Manual cut-off capability with I ^{2}C adjustments,
- Half tone, oversize blanking, external insertion detection, blue screen,
- Blanking control and RGB output stages.

2.8 µ-Controller

The ST92195 is the micro-controller, which is required for a color TV receiver. ST92195D1 is the version with one page Teletext and ST92195D7 is the one with 7 page Teletext. The IC has the supply voltages of 5 V and they are mounted in PSDIP package with 56 pins.
µ-Controller has the following features

- Display of the program number, channel number, TV Standard, analogue values, sleep timer, parental control and mute is done by OSD
- Single LED for standby and on mode indication
- System configuration with service mode
- 3 level logic output for SECAM and Tuner band switching

3. TUNER

Either a PLL or a VST tuner is used as a tuner.
UV1316 (VHF/UHF) is used as a PLL tuner. For only PAL M/N, NTSC M applications UV 1336 is used as the PLL tuner.
UV 1315 (VHF/UHF) is used as a VST Tuner.

Channel coverage of UV1316:

BAND	OFF-AIR CHANNELS		CABLE CHANNELS	
	CHANNELS	FREQUENCY RANGE (MHz)	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	E2 to C	48.25 to 82.25 (1)	S01 to S08	69.25 to 154.25
Mid Band	E5 to E12	175.25 to 224.25	S09 to S38	161.25 to 439.25
High Band	E21 to E69	471.25 to 855.25 (2)	S39 to S41	447.25 to 463.25

(1). Enough margin is available to tune down to 45.25 MHz.
(2). Enough margin is available to tune up to 863.25 MHz.

Noise	Typical	Max.	**Gain**	Min.	Typical	Max.
Low band	: 5dB	9dB	All channels	: 38dB	44dB	52dB
Mid band	: 5dB	9dB	Gain Taper (of-air channels)	:		8dB
High band	: 6dB	9dB				

Channel Coverage UV1336:

BAND	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	2 to D	55.25 to 139.25
Mid Band	E to PP	145.25 to 391.25
High Band	QQQ to 69	397.25 to 801.25

Noise is typically 6dB for all channels. **Gain** is minimum 38dB and maximum 50dB for all channels.

Channel Coverage of UV1315:

BAND	OFF-AIR CHANNELS		CABLE CHANNELS	
	CHANNELS	FREQUENCY RANGE (MHz)	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	E2 to C	48.25 to 82.25 (1)	S01 to S10	69.25 to 168.25
Mid Band	E5 to E12	175.25 to 224.25	S11 to S39	231.25 to 447.25
High Band	E21 to E69	471.25 to 855.25 (2)	S40 to S41	455.25 to 463.25

(1). Enough margin is available to tune down to 45.25 MHz.
(2). Enough margin is available to tune up to 863.25 MHz.

Noise	Typ.	Max.	**Gain**	Min.	Typ.	Max.
Low band	: 6dB	9dB	All Channels	: 38dB	44dB	50dB
Mid band	: 6dB	10dB	Gain Taper	:		8dB
High band	: 6dB	11dB	(off-air channels)			

4. MULTISTANDARD SOUND PROCESSOR

The MSP 34xxG is designed to perform demodulation of FM or AM-Mono TV sound. Three kinds of MSP's are used: MSP 3400G,MSP 3410G and MSP 3411G. The MSP 3400G is fully pin and software-compatible to the MSP 3410G, but is not able to decode NICAM. It is also compatible to the MSP 3411G,sound processor IC with virtual dolby sound.

5. SOUND OUTPUT STAGETDA7269A

The TDA7269A is a class AB dual Audio power amplifier, specially designed for high quality sound applications as Hi-Fi music centers and TV sets. It is supplied by ±12VDC coming from two separate windings in the SMPS transformer. It gives 2x14W(THD=10%) output power into an 8ohm load.

6. VERTICAL OUTPUT STAGE WITH STV9306

The STV9306 is a fully I^2C controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

7. VIDEO OUTPUT AMPLIFIER STV5112

The STV5112 consists of three monolithic video output amplifiers. The amplifier can be seen as an operational amplifier with negative feedback. The advantage of negative feedback is that the amplifier characteristics do not play an important role up to certain frequencies. The internal flash diodes protect the amplifiers against flash over in the picture tube. The only protections required at the cathode outputs are a flash resistor and a spark gap. Furthermore, the device has a high voltage power supply (VDD) and a low voltage one (VCC).

8. POWER SUPPLY (SMPS)

The DC voltages required at various parts of the chassis are provided by an SMPS transformer controlled by the IC MC44608 which is designed for driving, controlling and protecting switching transistor of SMPS. The transformer produces 150V for FBT input, ±12V for audio output IC, +5V and +8V for ST92195.

9. POWER FACTOR CORRECTION

Passive components are used for the solution of power factor correction.

10. SERIAL ACCESS CMOS 8K EEPROM 24C08

The 24C08 is a 8Kbit electrically erasable programmable memory (EEPROM), organized as 4 blocks of 256*08 bits. The memory is compatible with the I²C standard, two wire serial interface which uses a bi-directional data bus and serial clock.

11. CLASS AB STEREO HEADPHONE DRIVER TDA1308

The TDA1308 is an integrated class AB stereo headphone driver contained in a DIP8 plastic package.

12. CLASS AB MONO SUBWOOFER DRIVER TDA7261

The TDA7261 is a class AB dual Audio power amplifier, specially designed for high quality sound applications in mono TV chassis. It is supplied by ±12VDC.

13. SAW FILTERS

Saw filter type	:	**Model:**
G1975M	:	PAL B/G MONO
K2966M	:	PAL SECAM B/G/D/K/I MONO
J1981	:	PAL-I MONO
K2958M	:	PAL-SECAM B/G-D/K (38) MONO
K2962M	:	PAL-SECAM B/G/D/K/I/L/L' MONO
L9653M	:	SECAM L/L' AM MONO (AUDIO IF)
G3967M	:	PAL-SECAM B/G STEREO (VIDEO IF)
G9353M	:	PAL-SECAM B/G STEREO (AUDIO IF)
K3958M	:	PAL-SECAM B/G/D/K/I/L/L' STEREO (VIDEO IF)
K9356M	:	PAL-SECAM B/G/D/K/I STEREO (AUDIO IF)
K9656M	:	PAL-SECAM B/G/D/K/I/L/L' STEREO (AUDIO IF)
K3958M	:	PAL I NICAM (VIDEO IF)
K9356M	:	PAL I NICAM (AUDIO IF)
M1962M	:	PAL M/N NTSC M MONO
M3953M	:	PAL M/N NTSC M STEREO (VIDEO IF)
M9370M	:	PAL M/N NTSC M STEREO (AUDIO IF)

IC DESCRIPTIONS AND INTERNAL BLOCK DIAGRAM

- ST92195
- STV224X
- TUNER (UV1315, UV1316, UV1336)
- TDA7269A
- STV9306
- STV5112
- MC44608
- MSP 34XXG
- 24C08
- TDA1308
- SAW FILTERS

G1975M, K2966M, K2962M, L9653M, G3962M, G9353M, K3958M, K9356M, K9656M, K6263K, K9652M, M1962M, M3953M, M9370M

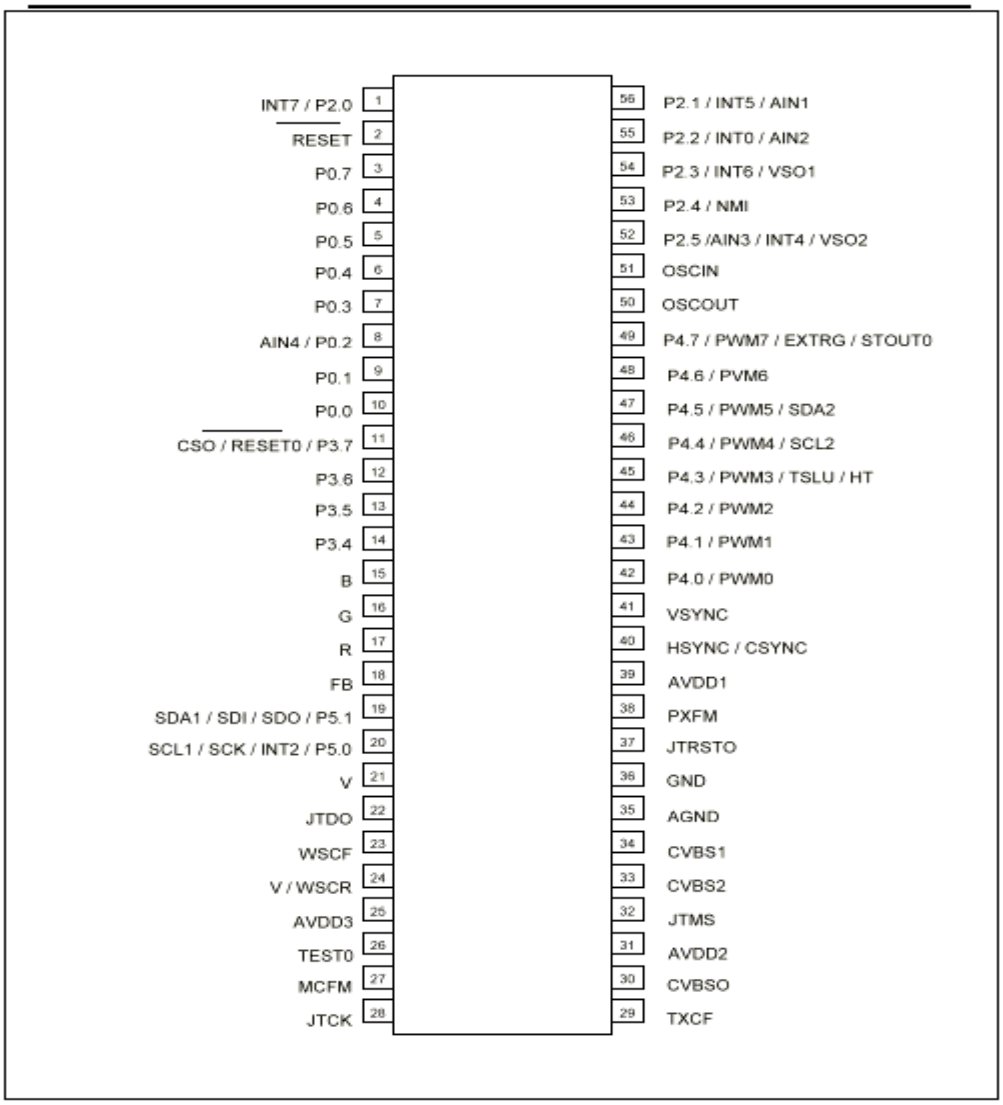
ST92195

The ST92195 is a member of the ST9+ family of micro-controllers, completely developed and produced by SGS-THOMSON Microelectronics using a proprietary n-well HCMOS process. The nucleus of the ST92195 is the advanced Core, which includes the Central Processing Unit (CPU), the ALU, the Register File and the interrupt controller. The Core has independent memory and register buses to add to the efficiency of the code. A set of on-chip peripherals form a complete sys-tem for TV set and VCR applications:

- Voltage Synthesis
- VPS/WSS Slicer
- Teletext Slicer
- Teletext Display RAM
- OSD

Additional peripherals include a watchdog timer, a serial peripheral interface (SPI), a 16-bit timer and an A/D converter.

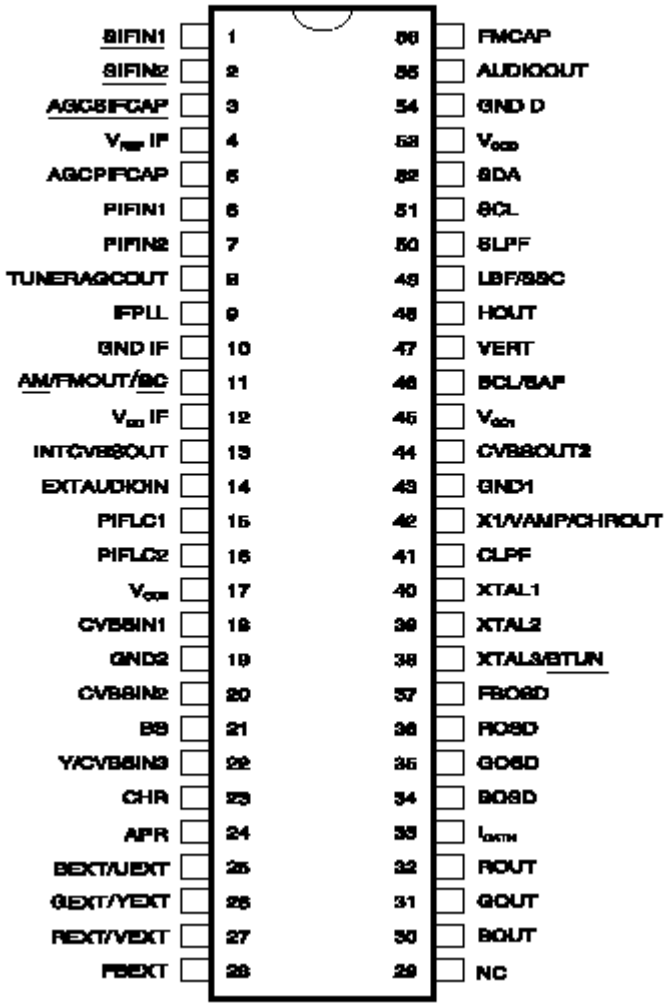
MICROCONTROLLER PIN DESCRIPTION



STV224X Video processor:

The STV2246/2247/2248 are fully bus controlled ICs for TV including PIF, SIF, luma, chroma and deflection processing. Used with a vertical frame booster (TDA1771 or TDA8174 for 90° chassis, STV9306 for 110° chassis), they allow the design of multi-standard (BGDKIMNLL, PAL/ SECAM/NTSC) sets with very few external components and no manual adjustments.

PIN CONNECTIONS STV224X/8X (SDIP56)



UV1315, UV1316, UV1336

General description of UV1315:

The UV1315 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'.

Features of UV1315:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR:B/G, H, L, L', I and I'; OIRT:D/K
- Voltage synthesized tuning (VST)
- Off-air channels, S-cable channels and Hyper-band
- Standardized mechanical dimensions and pinning

PINNING	PIN VALUE
1. Gain control voltage (AGC)	: 4.0V, Max:4.5V
2. Tuning voltage	
3. High band switch	: 5V, Min:4.75V, Max:5.5V
4. Mid band switch	: 5V, Min:4.75V, Max:5.5V
5. Low band switch	: 5V, Min:4.75V, Max:5.5V
6. Supply voltage	: 5V, Min:4.75V, Max:5.5V
7. Not connected	
8. Not connected	
9. Not connected	
10. Symmetrical IF output 1	
11. Symmetrical IF output 2	

Band switching table:

	PIN 3	PIN 4	PIN 5
LOW BAND	0 V	0 V	+ 5V
MID BAND	0 V	+ 5V	0 V
HIGH BAND	+ 5V	0 V	0 V

General description of UV1316:

The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'.

Features of UV1316:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR: B/G, H, L, L', I and I'; OIRT: D/K
- Digitally controlled (PLL) tuning via I²C-bus
- Off-air channels, S-cable channels and Hyper-band
- World standardized mechanical dimensions and world standard pinning
- Complies to "CENELEC EN55020" and "EN55013"

PINNING	PIN VALUE
1. Gain control voltage (AGC)	: 4.0V, Max:4.5V
2. Tuning voltage	
3. I²C-bus address select	: Max:5.5V
4. I²C-bus serial clock	: Min:-0.3V, Max:5.5V
5. I²C-bus serial data	: Min:-0.3V, Max:5.5V
6. Not connected	
7. PLL supply voltage	: 5.0V, Min:4.75V, Max:5.5V
8. ADC input	
9. Tuner supply voltage	: 33V, Min:30V, Max:35V
10. Symmetrical IF output 1	
11. Symmetrical IF output 2	

General description of UV1336:

UV1336 series is developed for reception of channels broadcast in accordance with the M, N standard.

Features of UV1336:

- Global standard pinning
- Integrated Mixer-Oscillator & PLL function
- Conforms to CISPR 13, FCC and DOC (Canada) regulations
- Low power consumption
- Both phono connector and 'F' connector are available

PINNING	PIN VALUE
1. Gain control voltage	: 4.0V, Max:4.5V
2. Tuning voltage	
3. Address select	: Max:5.5V
4. Serial clock	: Min:-0.3V, Max:5.5V
5. Serial data	: Min:-0.3V, Max:5.5V
6. Not connected	
7. Supply voltage	: 5.0V, Min:4.75V, Max:5.5V
8. ADC input (optional)	
9. Tuning supply voltage	: 33V, Min:30V, Max:35V
10. Ground	
11. IF output	

TDA7269A

General Description of TDA7269A

The TDA7269A is a class AB dual Audio power amplifier, specially designed for high quality sound applications as Hi-Fi music centers and TV sets. Requires very few external components.

- Wide supply voltage range up to ±20V
- Split supply
- High output power; 14 + 14W @THD =10%, R_L =8W,V_S= ±16V
- No pop at turn-on/off
- Mute (Pop free)
- Stand-by feature
- Thermal overload protection
- Short circuit protection to gnd

PINNING

1.	- V_S
2.	Output1
3.	+ V_S
4.	Output2
5.	Mute
6.	- V_S
7.	In+(2)
8.	In-(2)
9.	Gnd
10.	In-(1)
11.	In+(1)

STV9306

General description:

The STV9306 is a fully I^2C controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

FEATURES

- FULLY I^2C CONTROLLED
- DMOS POWER HALF-BRIDGE AMPLIFIER
- DC COUPLED OPERATION
- INTERNAL FLYBACK GENERATOR (UP TO 60V)
- SELF ADAPTED SAWTOOTH (50/60Hz)
- 100Hz OPERATION
- VERTICAL LINEARITY, AMPLITUDE AND CENTERING ADJUSTMENTS
- HORIZONTAL WIDTH, PINCUSHION, TRAPEZOID AND CORNER ADJUSTMENTS
- BREATHING CORRECTION
- 4/3, 16/9 CRT APPLICATION
- THERMAL PROTECTION
- LINEAR VERTICAL ZOOM FUNCTION
- E/W CLASS A OUTPUT
- LOW EXTERNAL COMPONENTS

PINNING

1.	SCL
2.	CRAMP
3.	SDA
4.	CHOLD
5.	SYNC
6.	Vs
7.	FLYBACK
8.	GND
9.	OUT
10.	VOPS
11.	EWOUT
12.	SENS2
13.	EWFB
14.	SENS1
15.	BREATHING

STV5112

General Description:

The STV5112 includes three video amplifiers designed with a high voltage bipolar/CMOS/DMOS technology (BCD). It drives directly the three cathodes and is protected against flashovers. Thanks to its three cathode current outputs, the STV5112 can be used with both parallel and sequential sampling applications.

Bandwidth : 8MHz TYPICAL
Supply Voltage : 220V typical
Rise and fall time : 50ns typical
CRT cathode current outputs for parallel or sequential cut-off or drive adjustment
Flashover protection
Power dissipation : 3.6W

PINNING	PIN VALUE
1.	BLUE INPUT
2.	VCC LOW VOLTAGE
3.	GREEN INPUT
4.	RED INPUT
5.	VDD HIGH VOLTAGE
6.	RED CATHODE CURRENT
7.	RED OUTPUT
8.	GROUND
9.	RED FEEDBACK
10.	GREEN OUTPUT
11.	GREEN CATHODE CURRENT
12.	GREEN FEEDBACK
13.	BLUE OUTPUT
14.	BLUE CATHODE
15.	BLUE FEEDBACK

MC44608

General description:

The MC44608 is a high performance voltage-mode controller designed for off–line converters. This high voltage circuit that integrates the start–up current source and the oscillator capacitor, requires few external components while offering a high flexibility and reliability.The device also features a very high efficiency stand–by management consisting of an effective Pulsed Mode operation. This technique enables the reduction of the stand–by power consumption to approximately 1W while delivering 300mW in a 150W SMPS.

- Integrated start–up current source
- Loss less off–line start–up
- Direct off–line operation
- Fast start–up

General Features

- Flexibility
- Duty cycle control
- On chip oscillator switching frequency 40, or 75kHz
- Secondary control with few external components

Protections

- Maximum duty cycle limitation
- Cycle by cycle current limitation
- Demagnetization (Zero current detection) protection
- “Over VCC protection” against open loop
- Programmable low inertia over voltage protection against open loop
- Internal thermal protection

GreenLine Controller

- Pulsed mode techniques for a very high efficiency low power mode
- Lossless startup
- Low dV/dT for low EMI radiations

PINNING	PIN VALUE
1. Demagnetization	Zero cross detection voltage: 50-mV typ.
2. I Sense	Over current protection voltage 1V typ.
3. Control Input	Min: 7.5V Max.: 18V
4. Ground	Iout $2A_{p-p}$ during scan $1.2A_{p-p}$ during flyback
5. Driver	Output resistor 8.5 Ohm sink 15 Ohm source typ.
6. Supply voltage	Max:16V (Operating range 6.6V-13V)
7. No connection	
8. Line Voltage	Min:50V Max:500V

MSP 34XXG

General description:

The MSP 34xxG family of single-chip Multi-standard Sound Processors covers the sound processing of all analog TV standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip.

Two-carrier FM systems according to the German or Korean terrestrial specs or the satellite specs can be processed with the MSP 34x0G. Digital demodulation and decoding of NICAM-coded TV stereo sound, is done only by the MSP 3410G. The MSP 34x0G offers a powerful feature to calculate the carrier field strength, which can be used for automatic standard detection (terrestrial) and search algorithms (satellite).

The MSP 3411G has all functions of the MSP34x0G with the addition of a virtual surround sound feature. Surround sound can be reproduced to a certain extent with two loudspeakers. The MSP3411G includes our virtualizer algorithm "3D-PANORAMA" which has been approved by the Dolby Laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP 34x1G includes our "PANORAMA" algorithm. The MSP34x1G has built-in automatic functions: The IC is able to detect the actual sound standard automatically (Automatic Standard Detection). Furthermore, pilot levels and identification signals can be evaluated internally with subsequent switching between mono/ stereo/ bilingual; no I^2C interaction is necessary (Automatic Sound Selection).

General Features

- Two selectable analog inputs (TV and SAT-IF sources)
- Automatic Gain Control (AGC) for analog IF input. Input range: 0.10–3 V pp
- Integrated A/D converter for sound-IF inputs
- All demodulation and filtering is performed on chip and is individually programmable
- Easy realization of all digital NICAM standards (B/G, D/K, I & L) with MSP 3410G.
- FM demodulation of all terrestrial standards (incl. identification decoding)
- FM demodulation of all satellite standards
- No external filter hardware is required
- Only one crystal clock (18.432 MHz) is necessary
- FM carrier level calculation for automatic search algorithms and carrier mute function
- Subwoofer output with on-chip programmable low-pass and complementary high-pass filters

DSP Section (Audio Base band Processing)

- Flexible selection of audio sources to be processed
- Two digital input and one output interface via I 2 S bus for external DSP processors, featuring surround sound, ADR etc.
- Digital interface to process ADR (ASTRA Digital Radio) together with DRP 3510A
- Performance of all de-emphasis systems including adaptive Wegener Panda1 without external components or controlling
- Digitally performed FM identification decoding and de-matrixing
- Digital base-band processing: volume, bass, treble, 5-band equalizer, loudness, pseudo-stereo, and base-width enlargement
- Simple controlling of volume, bass, treble, equalizer etc.

Analog Section

- four selectable analog pairs of audio base-band inputs (= four SCART inputs) input level: =<2 V RMS, input impedance: >=25 kW
- one analog mono input (i.e. AM sound): input level: =<2 V RMS , input impedance: >=15 kW
- two high-quality A/D converters, S/N-Ratio: >=85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities

24CO8

General description:

The 24C16 is a 8Kbit electrically erasable programmable memory (EEPROM), organized as 4 blocks of 256 * 08 bits. The memory operates with a power supply value as low as 2.5V.

Features:

- Minimum 1 million ERASE/WRITE cycles with over 10 years data retention
- Single supply voltage:4.5 to 5.5V
- Two wire serial interface, fully I^2C-bus compatible
- Byte and Multi-byte write (up to 8 bytes)
- Page write (up to 16 bytes)
- Byte, random and sequential read modes
- Self timed programming cycle

PINNING	PIN VALUE					
1. Write protect enable	: 0V					
2. Not connected	: 0V					
3. Chip enable input	: 0V					
4. Ground	: 0V					
5. Serial data address input/output	: Input LOW voltage	:	Min	: -0.3V,	Max :	0.3*Vcc
	: Input HIGH voltage	:	Min	: 0.7*Vcc,	Max :	Vcc+1
6. Serial clock	: Input LOW voltage	:	Min	: -0.3V,	Max :	0.3*Vcc
	: Input HIGH voltage	:	Min	: 0.7*Vcc,	Max :	Vcc+1
7. Multibyte/Page write mode	: Input LOW voltage	:	Min	: -0.3V,	Max :	0.5V
	: Input HIGH voltage	:	Min	: Vcc-0.5,	Max :	Vcc+1
8. Supply voltage	: Min	:	2.5V,		Max :	5.5V

TDA1308

Features:

- Wide temperature range
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
- high signal-to-noise ratio
- low distortion

PINNING	PIN VALUE
1. Output A (Voltage swing)	: Min:0.75V, Max:4.25V
2. Inverting input A	: Vo(clip):Min:1400mVrms
3. Non-inverting input A	: 2.5V
4. Ground	: 0V
5. Non-inverting input B	: 2.5V
6. Inverting input B	: Vo(clip):Min:1400mVrms
7. Output B (Voltage swing)	: Min:0.75V, Max:4.25V
8. Positive supply	: 5V, Min:3.0V, Max:7.0V

TDA7261

General Description of TDA7261

The TDA7261 is a class AB dual Audio power amplifier, specially designed for high quality sound applications in mono TV sets.

- Wide supply voltage range up to 50V ABS max.
- Split supply
- High output power;25W @THD =10%, R_L =8W,V_S= ±20V
- No pop at turn-on/off
- Mute (Pop free)
- Stand-by feature
- Thermal overload protection
- Short circuit protection to gnd

PINNING

1. N.C.
2. + V_S
3. Output
4. Mute/Stby
5. - V_S
6. In
7. GND
8. N.C.

Saw filter's list:

		VIDEO	AUDIO
MONO	PAL BG	G1975M	
	PSBG DK'	K2966M	
	PAL I'	J1981	
	PSBGDKK' I'	K2966M	
	PSBGDKK' LL'	K2962M	L9653

		VIDEO	AUDIO
STR	PAL BG	G3967M	G9353M
	PAL I I'	K3958M	K9356
	PS BG DK K' I I'	K3958M	K9356
	PS BG DK K' L L'	K3958M	K9656

PINNING

1. Input
2. Input-ground
3. Chip carrier-ground
4. Output
5. Output

K9656M, L9653M

PINNING

1. Input
2. Switching Input
3. Chip carrier-ground
4. Output
5. Output

CIRCUIT DESCIRIPTION

POWER SUPPLY

The ZX series of receivers incorporate a Motorola switch mode power supply using a MC 44608-regulator controller IC. The circuit provides power to the receiver in both standby and normal operation modes.

START UP

The switch on the mains supply is fed through the mains filter network TR801, the surge limiter resistor R831, the bridge rectifier D891, and reservoir capacitor C809 producing approx. 320 volts D.C to feed the switching MOSFET Q801 via the primary winding of TR802 pins 6 and 8.

Start up resistor R801 feeds from a 500V coming from the mains through the adder diode D809 to pin 8 of IC800, the IC uses 9mA current source and connects it internally to VCC at pin6 allowing a rapid charge enough for start up.

Then IC800 responds with the oscillator starting to oscillate at a 40khz frequency fixed by the IC manufacturer. The IC then produces, pulse width modulation pulses, at this frequency on pin 5 to drive the base of the switching FET Q801, that will then switch current on and off through the primary of TR802, which will in turn provides voltages in the secondary windings. The secondary winding voltages being proportional to the length of time that Q801 is turned on in each cycle. The voltage produced between pins 4 and 3 of TR802 is rectified by D804 developing approx. 12 volts on C810, which takes over from the start up resistor to supply pin 8 of IC800.

The Demag pin at pin1 offers 3 different functions: Zero voltage crossing detection (50mV), 24mA current detection and 120mA current detection. The 24mA level is used to detect the secondary reconfiguration status and the 120mA level to detect an Over Voltage status called Quick OVP. The VCC at pin6 operates between 6,6V and 13V in normal operation, when this voltage exceeds 15V then the IC output is disabled.

VOLTAGE REGULATION

After initial start up the secondary voltages of TR802 are established. These voltages then need to be regulated to the required levels. In a switch mode power supply such as this, it is the ON time of the switching FET Q801 that determines the output voltages produced. To provide regulation of the supply there is a feedback loop via an adjustable zener IC818 and an OPTO- coupler connected to pin3 of IC800. The reference voltage of IC818 is set to 2,5V to supply a B+ voltage of 150V. Any fluctuation at this pin will cause IC800 to compensate it either by increasing or decreasing the voltage at the secondary outputs.

VOLTAGE PROTECTION

The MC44608 offers two OVP functions:

1- A fixed function that detects when V CC is higher than 15.4V

2- A programmable function that uses the demag pin. The current flowing into the demag pin is mirrored and compared to the reference current Iovp (120mA). -Thus this OVP is quicker than normal number one as it directly sense the change in current rather than waiting for a specific voltage value, and is called QOVP. In both cases, once an OVP condition is detected, the output is latched off until a new circuit START–UP.

3- A software controlled function acts on pin52 of IC501. This pin monitors feedback from both 8V and 5V via D512, then compares these to a reference value Vref pre-set by the hardware through resistors R545, R546, R548. In normal mode operation 1.2V < Vref < 2.2V. Any voltage outside this window will cause the micro controller to force the TV to stand by mode by lowering the standby port. Refer to standby mode.

CURRENT PROTECTION

To monitor the current drawn by the receiver the source of Q801 is returned to the bridge rectifier through low value resistors R807 and R834. All the current drawn by the receiver will flow through that parallel resistors each time Q801 conducts, this will produce a voltage across the resistors proportional to the current drawn by the receiver. This voltage is fed to pin 2 of IC800 via R806.When the receiver is working normally the voltage across R807 and R834 is only a fraction of a volt and is not large enough to have any effect on IC800. Under fault conditions, if the receiver draws excessive current the voltage across these resistors will rise. This voltage is monitored by the current sense input pin2.

This Current Sense pin senses the voltage developed on the series resistor R806 inserted in the source of the power MOSFET. When I sense reaches 1V, the Driver output (pin 5) is disabled. This is known as the Over Current Protection function. A 200mA current source is flowing out of the pin 3 during the start–up phase and during the switching phase in case of the Pulsed Mode of operation. A resistor can be inserted between the sense resistor and the pin 3; thus a programmable peak current detection can be performed during the SMPS stand–by mode.

SAFETY PRECAUTIONS

Remember that all the primary side components of the power supply shown to the left of TR8O2 on the diagram are live to earth. It is recommended that a mains isolation transformer is used when servicing the receiver.

Many of the components in the power supply are safety critical. (R831,R809) are surge-limiting resistors, limiting the surge through the degauss coils when the reservoir capacitor is empty. These are marked with an exclamation mark in a triangle on the circuit diagram. These components MUST be replaced only with parts of identical value and safety characteristics. For reliability, it is recommended that only genuine parts are used for service replacements. Always check the main supply voltage feeding the line output stage after replacing parts in the power supply or line output circuit. The correct voltage is important for safety and reliability, the correct voltage should be 150 V ± 2 V.

When servicing note that the reservoir capacitor C809 can remain charged to high voltage for some time after the a.c. supply is removed. This can result in a shock hazard or damage to components whilst working on the receiver.
Do not try to test Q801 base emitter junction if C809 is charged, your meter will turn on the transistor which will discharge the capacitor resulting in a collector emitter short circuit. Do not discharge C809 quickly with a screwdriver etc. The very high current produced can damage the internal connections of the capacitor causing failure at a later date.
Remember when checking voltages to use a return path on the same side of TR802 for the Voltmeter earth to obtain the correct readings.

STANDBY OPERATION

As mentioned earlier the Start–up Management of MC44608 is as follows:
The Vi pin 8 of IC800 is directly connected to the HV DC rail Vin. This high voltage current source is internally connected to the VCC pin and thus issued to charge the VCC capacitor. The VCC capacitor charge period corresponds to the Start–up phase. When the VCC voltage reaches 13V, the high voltage 9mA current source is disabled and the device starts working. The device enters into the switching phase.
To help increase the application safety against high voltage spike on pin8 a small wattage 1k_series resistor is inserted between the Vin rail and pin 8. After this start-up the IC can distinguish between the different modes of operation using the following technique:

MODE TRANSITION

The LW latch is the memory of the working status at the end of every switching sequence. Two different cases must be considered for the logic at the termination of the SWITCHING PHASE:

1. No Over Current was observed
2. An Over Current was observed

These two cases correspond to the two signals “NOC” in case of “No Over Current” and “OC” in case of Over Current. The effective working status at the end of the ON time memorized in LW corresponds to Q=1 for no over current, and Q=0 for over current.

To enter the standby mode secondary side is reconfigured using D889 loop, this starts with the microprocessor ‘s pin 47 becomes high; as the standby port becomes high Q503 conducts and Q802 becomes off then D889 conducts and the high voltage output value becomes lower than the NORMAL mode regulated value. The shunt regulator IC818 is fully OFF. In the SMPS stand–by mode all the SMPS outputs are lowered except for the low voltage output that supply the wake–up circuit located at the isolated side of the power supply. In that mode the secondary regulation is performed by the Zener diode (D801) connected in parallel to the TL431. The secondary reconfiguration status can be detected on the SMPS primary side by measuring the voltage level at pin4 of TR802.

In the SMPS stand–by mode the 3 distinct phases are:

The SWITCHING PHASE: Similar to the Overload mode. The current sense clamping level is reduced. When VCC crosses the current sense section, the C.S. clamping level depends on the power to be delivered to the load during the SMPS stand–by mode. Every switching sequence ON/OFF is terminated by an OC as long as the secondary Zener diode voltage has not been reached. When the Zener voltage is reached the ON cycle is terminated by a true PWM action. The proper SWITCHING PHASE termination must correspond to a NOC condition. The LW latch stores this NOC status.
The LATCHED OFF PHASE: The MODE latch is set.
The START–UP PHASE is similar to the Overload Mode. The MODE latch remains in its set status (Q=1).
The SWITCHING PHASE: The Stand–by signal is validated and the 200uA is sourced out of the Current Sense pin 2.

SMPS SWITCH OFF

When the mains is switched OFF, so long as the electrolytic bulk capacitor provides energy to the SMPS the controller remains in the switching phase. Then the peak current reaches its maximum peak value, the switching frequency decreases and all the secondary voltages are reduced. The VCC voltage is also reduced. When VCC is less than 6,5V, the SMPS stops working.

MICROPROCESSOR IC501

IC 501 controls all the functions of the receiver operated by the remote control and the front panel customer controls. It produces the on screen graphics, operates tuning, customers controls and engineering controls, and also incorporates all of the Teletext functions. It also controls the video processor, the audio processor, and the tuner. The circuits just mentioned are controlled via the I²C bus. Also IC501 controls the video source switching, vertical position adjustment and the vertical linearity adjustment via its ports.

An external 8K EEprom is used by the micro. The EEprom comes fully programmed. The main clock oscillator is 4.0 MHz crystal X501 on pins 50 and 51. Reset is provided on pin 2 via Q504. On switching on pin 2 becomes high and the controller gets reset which stays valid till a low signal comes on that pin.

CONTROLS

Command information from the infra red remote controller is fed through the sensor to pin 1 of the microprocessor. Operation of the customer front panel keys is detected by pin 8 that is an ADC (analogue to digital converter). Pressing a switch will connect the 5V to the ground through a particular resistor that determines the value of the voltage on pin8 at that instant. This obtained value is comprehended by the micro and the corresponding operation is performed. Refer to the following table:

Button	Theoretical voltage
P+	1.5V
P-	2.0V
V+	3.0V
V-	4.0V
Menu	1.0V

IC501automatically switches from TV mode to AV1, AV2 by detecting the signal from pin29 or pin8 at the scart connector, through its 56, 55 pins. The picture mode is determined according to the following table:

Direct voltage	Voltage Incrementing	Picture mode
0 to 2.0 V	0 to 4.5 V	TV mode
2.0 to 7.0 V	4.5 to 9.5	16:9 Mode
7.0 to 12 V	9.5 to 12	4:3 Mode

TUNING

All the tuning functions are carried by the microprocessor IC501. Three tuning modes are available for this chassis, VST tuning, PLL tuning, and frequency tuning. In all of these both manual and automatic modes are possible. If Auto Tuning Mode is selected the receiver tunes Band 1, Band2, and UHF, putting into memory the channel, signal strength (signal's amplitude for VST and video indent for PLL), and tuning data of each TV station found. The memories are then stored automatically to put the channels into frequency order from lowest frequency to the highest one. In APS (Auto-Programming-System) TV sets the channels are stored according to the standard tables provided for each country.

In VST mode IC501 generates the tuning control voltage as pulse width modulation output at pin54. This pulse operates a voltage switch Q502 converting the 0 to 5V pulse into a 0 to 33V pulses that are then integrated and smoothed by R550/553/ 567 and C548/535/238 to give a steady DC voltage of value between 0 to 33V for tuning control on pin 2 of the tuner. IC501 also controls the band switching of the tuner by pins 12/13/14 via Q505, Q506 and Q507 for the different bands UHF, Band1, and Band2.

In both PLL and frequency tuning modes the tuning process is controlled by IC501 via the I²C BUS. In PLL mode a table for all the channels available is set according to the standards and the micro controller uses these values to set the central frequency of the required channel. This mode is quicker that VST mode.

Frequency tuning is a new feature to this chassis; it takes the advantages of both VST and PLL tuning. As in PLL mode the tuning process is controlled via I²C bus, however the channels' are not predefined in the software by a table on the con trary these are scanned as in VST but here the frequency changes and not the voltage. In frequency tuning the micro generates I²C signals to account for a 1MHz frequency increment on the tuner and then scan all the frequency either manually or automatically. This method is faster than the VST and more precise than PLL tunings.

Automatic fine tuning (AFT) correction voltage is done internally inside IC403 and fed to the microprocessor via I²C BUS. This is used by the software to modify the mark space output at pin 54 producing the tuning voltage. The AFT voltage is also used in tuning mode to identify the presence of a signal whilst tuning. This is used in auto tuning mode to determine the optimum frequency setting for the channel. Tuner AGC voltage from pin 8 of IC403 is taken directly to the tuner.

VOLUME CONTROL

A pulse width modulation output is developed inside the processor and is fed to the audio processor in stereo sets and to the video processor in mono sets via the I²C BUS to control the volume. The physical control on the front panel works in the same way.

TELETEXT

The microprocessor IC501 performs all of the teletext functions internally. The Composite Blanking video and Sync signal (CBVS) is input to pin 33 of the micro from pin 29 of IC403. When text is selected the text graphics are output as R.G.B signals on pins 15/16/17 of the micro and fed to pins 34/35/36 of IC403. At the same time pin 18 of the micro goes high taking pin 37 of IC403 high, blanking the picture and selecting text R.G.B. input.
Note. mixed mode is available and fast text with 8-page memory.

A.V SWITCHING

A.V. input can be selected from the remote control or by applying 6 to12 volts from pin 8 of the scart connector, This takes pin 55/56 of the micro high (5 volts). When external A.V input is requested pin 55 or Pin 56 of the micro goes high. This is then transmitted via the I²C bus to IC403, selecting external signals from the scart connector.

SERVICE MODE

The AK37 chassis incorporates an electronic service mode operated by the micro. Full details are given on pages 20 to 25 of the service manual. The mode is entered by a combination of button presses (4-7-2-5), whilst the Main menu is on the screen. You can select any adjustment and change it.

A list of adjustments is available such as OSD position, IF central frequency adjustment, AGC, vertical linearity, size, position, horizontal position, R.G.B gains, APR, tuner settings for PLL tuners, and five options for the TV set features configurations.

EEPROM INITIALIZATION

If the E²PROM IC500 is replaced it will come fully programmed and therefore it is not necessary to initialise the new device. In some circumstances the E²PROM may become corrupted in use i.e. static discharge or lightning strike. If this happens, it is advised that the E²PROM is replaced.

OFF AIR SIGNAL PATH
TUNER

A UV1315 voltage controlled tuner is used on the AK37 chassis, operating from a 5volt supply, line (pin6). A 0 to 33 volt rail is used for tuning (pin 2), controlled by the microprocessor IC501. The AFT pin on the tuner is not used, instead the Automatic Fine Tuning is achieved by modifying the tuning control line. This is done by software in IC501. The gain of the tuner can be altered by the AGC control voltage fed in to pin1.

The tuner produces a balanced output on pins 10,11. Neither side is connected to earth. This is fed via a surface wave filter Z402 to the IF input of IC403 (pins 6 and 7).

IC403 incorporate the IF amplification, AFT, AGC, video and sound detectors as well as AV switching. The IC requires both 5 and 8 V tuned circuit for these functions, L401, L402, L403, and L406.

VIDEO PATH

The detected video signal is output from pin 13 of IC403, to sound traps Z403/404. The video is taken from the other side via the appropriate filter to pin 18 of IC403. (1.2 p to p) Video to the scart connectors is taken after R473 to Pin 40 of the scart connector. The CVBS_TXT output pin 29 output is fed to IC501 pin 34 (for teletext). The video signal is sometimes labelled CVBS on the circuit diagram. This stands for Composite Video Blanking & Sync.

The composite signal is input pin 13 (Video input) of IC403. This IC carries out all of the luma/Chroma processing internally and also provides the customer control functions of brightness, contrast, sharpness and saturation. IC403 is I²C bus controlled and incorporates auto greyscale circuitry and internal luma/chroma delay lines. The resulting R.G.B drive is output on pins 30,31 and 32. The R.G.B passes via connector PL405 to the CRT base PCB. Here the R.G.B signal is amplified by IC900 to provide drive for the cathodes of the CRT. IC900 produces a feedback signal which is fed to IC403 (pin 33) for blanking and auto grayscale correction.

SOUND PATH

The demodulated mono sound is taken from pin 55 of IC403 directly to the sound output stage IC301 Pin 7. The output signal from IC301 is Volume controlled achieved within IC403 using the I²C bus line from IC501. To limit the volume at the specified out put the A_out pin 55 is fed to IC301 through a voltage divider R455 and R454. Muting of the output stage is provided from Pin 46 of IC501 to pin5 IC301.

In the stereo model the IF from pins 10 & 11 of the tuner passes through Z401 and the output signal goes through pins 1&2 of IC403. The output QSS signal from IC403 is taken from pin 11 and sent to audio processor IC700. The left channel is output on pin 29 and the right channel output is on pin 28.Then this outputs are fed directly to IC301.
IC403 handles also the AM modulated signals in L/L' systems at pins 1&2.

AV INPUT SIGNAL PATH
Video and Sound

IC403 has three CVBS inputs at pins 18,20 and 22.The composite video signal of AV1 is taken from pin 41 of the scart connector to pin20 of IC403. The mono sound signal is taken from pins 23 and 27 of the scart sockets to the switching transistors Q101. The transistor switch the audio depending on the source, and is then fed to pin14 of IC403. The CVBS coming from AV2 or AV3 is taken from pin20 of scart connector, from the JK101 for BAV or FAV, from the JK102 for SVHS. Then these signals are switched by transistors Q141; Q142 depending on the source by the microprocessor's pins 5,6,7. The resultant signal is given to pin 22 of IC403.

Scart two supports also SVHS signals and then the chroma comes from pin 15 of connector PL101 directly to pin 23 of IC403, whilst the luma uses the same path as the CVBS of AV2.

When AV input is selected pin 5,6,7 of the microprocessor IC50 I is taken high, this switches the IC403 to external input mode via I²C BUS. This connects the video inputs on pins 20 or 22 to IC403 and the audio input on pin 14 to the audio out on pin 55 (via the internal volume control circuit) The signal paths are then as for off air.
The chassis can detect the video signals on scart 1 and 2 using pin 8 switching voltages at pins 56 and 55 of IC501.

R.G.B

The R.G.B signals from pins 28,32 and 36 of the scart connector (PL101) are fed to the R.G.B input pins (25,26,27) of IC403. R.G.B operation can be enabled by either taking pin 37 of the scart connector high, this high is fed to Pin 28 of IC403, or via the I²C bus the microprocessor sets IC403 to forced R.G.B mode in which the video processor generates its own fast blank signal. This puts the IC into external R.G.B mode and selects the inputs on pins 25,26 and 27, overriding the video input on pin 20/22.
Note: When using R.G.B input the contrast, brightness and colour controls will still operate.

LINE CIRCUIT

Line and frame drive are generated by IC403. The sync pulses are separated from the incoming video signal at pins 18/20/22 and used to control the internal circuitry of the IC. Line drive is produced by counting down the external 4.43 MHz crystal at pin 40 to15.625 kHz locked to the incoming sync. This drive is output on pin 48 and feeds directly to the line drive transistor Q600. Note. that the output of IC403 Pin 48 is an open-collector and requires a pull up resistor, if the pin is open circuited for test no waveform will be seen. Q600 collector feeds the line output transistor Q601.
The line output stage is conventional with a transformer containing a split diode winding for EHT generation; fifth harmonic tuning is achieved by capacitor C618/619.

FIELD OUTPUT VERTICAL SHIFT

A fly-back pulse is taken from pin 1 of the FBT transformer. This is required by IC403 (Pin 49) for burst / sync gating, and RGB line blanking. The ver_sync signal is output from the pin47 and fed to pin41 of IC501. The H_sync pulse is taken from pin 1 of the FBT and fed to the micro at pin 40.These two signals are required by the micro for graphics timing and also for text.
IC403 generates a vertical pulse signal V_OUT that is fed to IC601 (the vertical stage IC). IC601 is supplied by a 26V DC via diode D616 and a 13V DC via diode D613 .It generates its own ramp signal and based on the V_OUT signal and produces the vertical deflection signals that are fed to connector PL602. Horizontal adjustments (Horizontal amplitude, pincushion, corner correction) are controlled by EW_OUT at pin 11.This output drives the transistor Q602.

B.C.L CIRCUIT (BEAM CURRENT LIMITER)

Beam current limiting is employed to protect the circuitry in the receiver, the CRT and to prevent excessive X-Ray radiation in fault conditions. The current drawn by the CRT is monitored by the current drawn through the winding of the fly-back transformer that produces the EHT for the CRT anode. The end of the winding (Pin 10) is returned to IC403 pin 46, the beam current drawn by the CRT passes through Q601 and develops a voltage on the collector proportional to the current (V=IxR). The voltage on the collector will vary depending on the beam current being drawn reducing the brightness and contrast of the picture. If the voltage is sufficiently negative (indicating very high excess beam current) the output will be reduced, reducing the picture brightness and contrast.

AK37 CHASSIS MANUAL ADJUSTMENT PROCEDURE

In order to enter service menu, first enter the main menu and then press the digits 4, 7, 2 and 5 respectively. To select adjust parameters, use Ù or Ú buttons. To change the selected parameter, use < or > buttons. Selected parameter will be highlighted.

Entire service menu parameters of AK37 CHASSIS are listed below. For some of parameters the default values are given on the same table.

REGISTER	PARAMETER	NOTE
OSD	OSD Horizontal Position	ADJUST HORIZONTAL POSITION FOR OSD
IF1	IF Coarse Adjust	
IF2	IF Fine Adjust	
IF3	IF Coarse Adjust for L-Prime	
IF4	IF Fine Adjust for L-Prime	
AGC	Automatic Gain Control	
VLIN	Vertical Linearity	ADJUST VERTICAL LINEARITY
VS1A	Vertical Size for 50 Hz / 4:3 (AK30)	
VS1B	Vertical Size for 50 Hz / 16:9 (AK30)	
VP1	Vertical Position for 50 Hz (AK30)	
HP1	Horizontal Position for 50 Hz (AK30)	
VS2A	Vertical Size for 60 Hz / 4:3 (AK30)	
VS2B	Vertical Size for 60 Hz / 16:9 (AK30)	
VP2	Vertical Position for 60 Hz (AK30)	
HP2	Horizontal Position for 60 Hz (AK30)	
RGBH	RGB Horizontal Shift Offset	CVBS – RGB HORIZONTAL POSITION COMPENSATION
VSOF	Vertical Size Offset for 60Hz (AK37)	ADJUST AFTER SETTING ALL GEOMETRY VALUES IN 50 HZ
VPOF	Vertical Position Offset for 60 Hz (AK37)	ADJUST AFTER SETTING ALL GEOMETRY VALUES IN 50 HZ
HSOF	Horizontal Size Offset for 60 Hz (AK37)	ADJUST AFTER SETTING ALL GEOMETRY VALUES IN 50 HZ
HPOF	Horizontal Position Offset for 60 Hz (AK37)	ADJUST AFTER SETTING ALL GEOMETRY VALUES IN 50 HZ
HTOF	Horizontal Trap Correction Offset for 60 Hz (AK37)	ADJUST AFTER SETTING ALL GEOMETRY VALUES IN 50 HZ
WR	White Point Adjust for RED	
WG	White Point Adjust for GREEN	
WB	White Point Adjust for BLUE	
BR	Bias for RED	
BG	Bias for GREEN	
APR	APR Threshold	
FMP1	FM Prescaler when AVL is OFF	STEREO ONLY
NIP1	NICAM Prescaler when AVL is OFF	STEREO ONLY
SCP1	SCART Prescaler when AVL is OFF	STEREO ONLY
FMP2	FM Prescaler when AVL is ON	STEREO ONLY
NIP2	NICAM Prescaler when AVL is ON	STEREO ONLY
SCP2	SCART Prescaler when AVL is ON	STEREO ONLY
S1V	SCART1 Volume	STEREO ONLY
S2V	SCART2 Volume	STEREO ONLY
F1H	High Byte of crossover frequency for VHF1-VHF3	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
F1L	Low Byte of crossover frequency for VHF1-VHF3	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
F2H	High Byte of crossover frequency for VHF3-UHF	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
F2L	Low Byte of crossover frequency for VHF3-UHF	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
BS1	Band Switch Byte for VHF1 Meaningful for only	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
BS2	Band Switch Byte for VHF3 Meaningful for only	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
BS3	Band Switch Byte for UHF Meaningful for only	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
CB	Control Byte Meaningful for only PLL Tuner	MEANINGFUL FOR ONLY PLL TUNER (see tuner setting table)
OP1	Option 1 (see the Option List)	PERIPHERAL OPTIONS (see option table)
OP2	Option 2 (see the Option List)	RECEPTION STANDART OPTIONS (see option table)
OP3	Option 3 (see the Option List)	VIDEO OPTIONS (see option table)
OP4	Option 4 (see the Option List)	TV FEATURE OPTIONS (see option table)
OP5	Option 5 (see the Option List)	CHANNEL TABLE OPTIONS (see option table)
TX1	Teletext Option 1 (see the Option List)	TELETEXT OPTIONS (see option table)
GEOM	Geometry Option (see the Option List) (AK37)	GEOMETRY OPTIONS (see option table)

In order to enter the geometry menu, press the green button on the remote control :

REGISTER	PARAMETER	NOTE
VSIZ	Vertical Size	ADJUST VERTICAL SIZE (50 HZ)
VPOS	Vertical Position	ADJUST VERTICAL POSITION (50 HZ)
VSCO	Vertical S Correction.	ADJUST VERTICAL S CORRECTION (50HZ)
VCCO	Vertical C Correction.	ADJUST VERTICAL C CORRECTION (50HZ)
HSIZ	Horizontal Size	ADJUST HORIZANTAL SIZE (50 HZ)
HPOS	Horizontal Position.	ADJUST HORIZANTAL POSITION (50 HZ)
HPCO	Horizontal Pincushion Correction for	ADJUST HORIZANTAL PINCUSHION CORRECTION (50 HZ)
HCCO	Horizontal Corner Correction.	ADJUST HORIZANTAL CORNER CORRECTION (50HZ)
HTCO	Horizontal Trap Correction.	ADJUST HORIZANTAL TRAP CORRECTION (50HZ)
VZSZ	Zoom Vertical Size.	ADJUST VERTICAL SIZE FOR ZOOM MODE (50HZ)

USING REMOTE CONTROL BUTTONS

RED BUTTON (For Stereo models only): It switches the AVL to ON or OFF mode on service menu.
AVL word is visible on service menu when AVL is on.
GREEN BUTTON : It is used to enter the geometry menu.
YELLOW BUTTON : It switches to VERTICAL SCAN DISABLE mode on service menu. It is usefull to adjust screen voltage. It is also used as Program Down button on geometry menu.
BLUE BUTTON : It is used to adjust AGC and IF automatically on service menu.It is also used as Program Up button on geometry menu.
TTX UPDATE BUTTON : It is used to change the picture mode on geometry menu.

WHITE BALANCE ADJUSTMENT

The following three parameters are used to make white balance adjustment. To do this, use a Colour Analyser. Using WR (White point adjust for RED), WG (White point adjust for GREEN), WB (White point adjust for BLUE) parameters, insert the + sign in the square which is in the middle of the screen.
The suggested values for these parameters are given on the table above.

AGC ADJUSTMENT

In order to do AGC adjustment, enter a **60dBmV** RF signal level from channel C-12 (224.25 MHz)
Select AGC parameter from service menu. Press BLUE (INSTALL) button from remote controller. The adjustment will be done automatically by software. See the AGC indicator on service menu, it must be 1. Check that picture is normal at 90dBmV signal level.

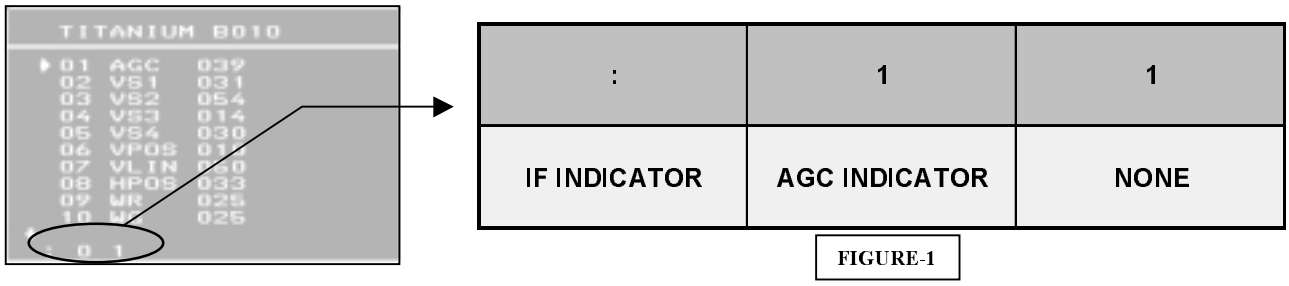


FIGURE-1

IF NEGATIVE ADJUSTMENT (WITHOUT L' SYSTEMS)

Set the video pattern to a **PAL colour bar** pattern with frequency **38.9 MHz**. Apply this IF signal to PIN-10 and PIN-11 of tuner. Press PROG-1 and after that BLUE (INSTALL)button from remote controller. Select the standart as **BG** or **I**. (if BG is not available) Enter service menu. Select **IF1** parameter from service menu and press BLUE (INSTALL) button from remote controller. IF adjustment will be done automatically by software. See the IF indicator on service menu, it must be like on FIGURE-1 shown above.

IF POSITIVE ADJUSTMENT (WITH L' SYSTEMS)

Set the video pattern to a **SECAM-L colour bar** pattern with frequency **33.9 MHz**. Apply this IF signal to PIN-10 and PIN-11 of tuner. Press PROG-1 and after that BLUE (INSTALL)button from remote controller. Select the BAND VHF-1 (S1 – S4 for PLL tuners) and standard as **L'**. Enter service menu. Select **IF1** parameter from service menu and press BLUE (INSTALL) button from remote controller. IF adjustment will be done automatically by software. See the IF indicator on service menu, it must be like on FIGURE-1 shown above.

OSD HORIZONTAL POSITION ADJUSTMENT

Select OSD parameter on service menu. Adjust the horizontal position of OSD to the middle of screen, by using the reference bar on bottom of service menu.

TELETEXT BRIGHTNESS ADJUSTMENT

Set the TV set to a channel with Teletext. Enter service menu. Press TEXT button from remote controller. Adjust BRIGHTNESS parameter to value **39** by using left-right buttons from remote controller. Press TV button and MENU button from remote controller respectively. Adjustment is done.

GEOMETRY ADJUSTMENTS

First adjust all the 50 Hz geometry values defined in geometry menu for each picture mode. Then, enter service menu and adjust 60 Hz geometry values for each picture mode by using offset adjustment items.

Vertical Size for 50 Hz (VSIZ and VZSZ) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change VSIZ till the picture format becomes the required format. Check and readjust Vertical Size item if the adjustment becomes improper after some other geometric adjustments are done. Repeat this for every picture mode.Use VZSZ for proper vertical size adjustment in zoom,subtitle and cinema modes.
Vertical Position for 50 Hz(VPOS) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change Vertical Position till the test pattern is vertically centred. Horizontal line at the centre pattern is in equal distance both to upper and lower side of the picture tube. Check and readjust Vertical Position item if the adjustment becomes improper after some other geometric adjustments are done. Repeat this for every picture mode.
Horizontal Size for 50 Hz (HSIZ) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change HSIZ (Horizontal Size) till the picture format becomes the required format. Check and readjust Horizontal Size item if the adjustment becomes improper after some other geometric adjustments are done. Repeat this for every picture mode.
Horizontal Position for 50 Hz (HPOS) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change Horizontal Position till the picture is horizontally centred. Check and readjust Horizontal Position item if the adjustment becomes improper after some other geometric adjustments are done. Repeat this for every picture mode.
Horizontal Trap Correction for 50 Hz (HTCO) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change HTCO till the picture format becomes the required format. Repeat this for every picture mode.
Vertical S Correction for 50 Hz (VSCO) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change VSCO till the picture format becomes the required format. Repeat this for every picture mode.
Vertical C Correction for 50 Hz (VCCO) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change VCCO till the picture format becomes the required format. Repeat this for every picture mode.
Horizontal Pincushion Correction for 50 Hz (HPCO) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change HPCO till the picture format becomes the required format. Repeat this for every picture mode.
Horizontal Corner Correction for 50 Hz (HCCO) Enter a PAL B/G circle test pattern via RF. Enter geometry menu and press TTX UPDATE button from remote controller to switch to any picture mode on geometry menu. Change HCCO till the picture format becomes the required format. Repeat this for every picture mode.
Vertical Size Offset for 60 Hz (VSOF) Enter a NTSC-M circle test pattern in any picture mode via RF. Enter service menu. By changing VSOF value adjust vertical size for 60Hz. Repeat this for every picture mode.
Vertical Position Offset for 60 Hz (VPOF) Enter a NTSC-M circle test pattern in any picture mode via RF. Enter service menu. By changing VPOF value adjust vertical position for 60Hz. Repeat this for every picture mode.
Horizontal Size Offset for 60 Hz (HSOF) Enter a NTSC-M circle test pattern in any picture mode via RF. Enter service menu. By changing HSOF value adjust horizontal size for 60Hz. Repeat this for every picture mode.
Horizontal Position Offset for 60 Hz (HPOF) Enter a NTSC-M circle test pattern via RF. Enter service menu. By changing HPOF value adjust horizontal position for 60Hz. Repeat this for every picture mode.
Horizontal Trap Correction Offset for 60 Hz (HTOF) Enter a NTSC-M circle test pattern via RF. Enter service menu. By changing HTOF value adjust horizontal trap correction for 60Hz. Repeat this for every picture mode.
RGB MODE Horizontal Position (RGBH) Enter a RGB circle test pattern via video inputs. Force the TV to RGB mode by pressing AV button from remote controller. Change RGB Horizontal Position till the picture is horizontally centred. Check and readjust RGBH item if the adjustment becomes improper after some other geometric adjustments are done.

50 Hz. 4:3 Geometry Adjustment for 4:3 Tube

50 Hz. 16:9 Geometry Adjustment for 4:3 Tube

50 Hz. 14:9 Geometry Adjustment for 16:9 Tube

OPTION SETTINGS

Select concerned OPTION from service menu. To change a bit on selected option press the same number from remote controller. So this bit will be changed from 1 to 0 or from 0 to 1. If any option is selected on service menu you will see an indicator row shows you the bit numbers.

OP1 – Peripheral Options		
		NOTE
BIT-7	NOT USED	0 default value
BIT-6	1, Display "AV-3" as "F-AV" 0, Display "AV-3" as "B-AV"	FAV or BAV IN selection option
BIT-5	1, Turn back TV mode after the last AV (with AV key) 0, Turn back first AV mode after the last AV	
BIT-4	1, SVHS is available in AV key stream 0, SVHS is NOT available in AV key stream	1, if AV-2 is selected
BIT-3	1, RGB is available in AV key stream 0, RGB is NOT available in AV key stream	1, if AV-1 is selected
BIT-2	1, AV-3 is available in AV key stream 0, AV-3 is NOT available in AV key stream	1, if FAV-IN or BAV-IN available
BIT-1	1, AV-2 is available in AV key stream 0, AV-2 is NOT available in AV key stream	
BIT-0	1, AV-1 is available in AV key stream 0, AV-1 is NOT available in AV key stream	

OP2 – Reception Standard Options		
		NOTE
BIT-7	1, 3-button keyboard (V-, P+, V+) 0, 4/5 button keyboard (V-, V+, P-, P+, Menu)	0, default value
BIT-6	1, L/L' is available 0, L/L' is not available	
BIT-5	1, I is available 0, I is not available	
BIT-4	1, DK is available 0, DK is not available	
BIT-3	1, BG is available 0, BG is not available	
BIT-2	1, 3D PANORAMA is visible 0, DOLBY VIRTUAL is visible	
BIT-1	1, For Secam LLP,EXT MONO INPUT is available 0, Inner demodulation is available for SECAM LLP	
BIT-0	1, Low power consumption at standby is available 0, low power consumption at standby is not available	1, default value

OP3 – Video Options		
		NOTE
BIT-7 BIT-6	Xtal Configuration 00, 1 Xtal PAL 4.43 01, 2 Xtal PAL/NTSC 4.43/3.58 10, 1 Xtal PAL/SEC/NTSC 4.43 11, 2 Xtal PAL/SEC/NTSC 4.43/3.58	
BIT-5	1, Enable Blue back when no signal in AV mode 0, blank back when no signal in AV mode	1, default value
BIT-4	1, White Insertion is ON 0, White Insertion is OFF	1, default value
BIT-3	1, Blue Background when no signal in TV mode 0, Disable Blue Background in TV mode	
BIT-2	1, Semi-transparent background for OSD 0, Solid Menu background for OSD	1, default value
BIT-1	1, Black Stretch is ON 0, Black Stretch is OFF	0, default value
BIT-0	1, APR is ON 0, APR is OFF	1, default value

OP4 – TV Features		
		NOTE
BIT-7	1, Headphone is available (for STEREO models) 0, Headphone is not available	
BIT-6	1, Arabic/Persian is available in menu languages(for A,D,E,F, and later) 0, Arabic/Persian is not available in menu languages	
BIT-5	1, Hebrew is available in menu languages(for A,D,E,F, and later) 0, Hebrew is not available in menu languages	
BIT-4	1, Hotel Mode can be activated 0, Hotel Mode can not be activated	
BIT-3	1, No Signal Timer is enabled 0, No Signal Timer is disabled	3 min. countdown and switch off when no signal
BIT-2	1, Frequency based search for PLL tuner 0, Channel table based search for PLL tuner no meaning for VST tuner	
BIT-1	1, 3-band tuning (VHF1, VHF3, UHF) 0, 1-band tuning (only UHF)	1, default value
BIT-0	1, Extra 200 msec blanking for VST 0, no extra blanking	1, default value

OP5 – Channel Tables		
		NOTE
BIT-7	1, Extra 150 msec blanking more for VST 0, no extra blanking	1, default value
BIT-6	1, "Programme" item in AUTOSTORE menu is visible 0, "Programme" item in AUTOSTORE menu is invisible	1, default value
BIT-5	1, Force both channel on even no carrier(carrier mute disable) 0, Default value after reset	
BIT-4	1, French OS Channel Table is available 0, French OS Channel Table is not available	1, when L/L' is available
BIT-3	1, French Channel Table is available 0, French Channel Table is not available	1, when L/L' is available
BIT-2	1, England Channel Table is available 0, England Channel Table is not available	1, when I/I' is available
BIT-1	1, East Europe Channel Table is available 0, East Europe Channel Table is not available	1, when B/G is available
BIT-0	1, West Europe Channel Table is available 0, West Europe Channel Table is not available	1, when DK is available

TX1 – Teletext Options		
		NOTE
BIT-7	1, AUTO_APS is available after power_on 0, AUTO_APS is not available	
BIT-6	RESERVED (must be 0)	0, default value
BIT-5 BIT-4 BIT-3	**5 4 3 Teletext Language Groups** **000, Group 1 – West** (English, French, Swedish, Czech, German, Portuguese, Italien, Rumanian) **001, Group 2 – West/East** (Polish, French, Swedish, Czech, German, Serbian, Italien, Rumanian) **010, Group 3 – West/Turkish** (English, French, Swedish, Turkish, German, Portuguese, Italien, Rumanian) **011, Group 4 – East/Cyrillic** (English, Cyrillic, Swedish, Czech, German, Serbian, Lettish, Rumanian) **100, Group 5 – Arabic** (English, French, Swedish, Turkish, German, Hebrew, Italien, Arabic)	
BIT-2 BIT-1 BIT-0	**2 1 0 Device type selection** 000, EPROM M6 A 001, ROM H5 P 010, ROMLESS H5 P 011, EPROM M6 R 100, ROM M6 R 101, OSDEPROM M6 R 110, ROM M6 P 111, Read Auto Gain Table for the device from EEPROM	101, default value

GEOM – Geometry Options		
		NOTE
BIT-7	NOT USED	0, default value
BIT-6	1, SVHS audio input in FAV/BAV in 0, SVHS in AV2	1, default value.
BIT-5	1, AK37 adjustment values are valid(default for AK37) 0, AK30 adjustment values are valid	
BIT-4	1, Zoom mode is available 0, Zoom mode is not available	
BIT-3	1, Subtitle mode is available 0, Subtitle mode is not available	
BIT-2	1, Cinema mode is available 0, Cinema mode is not available	
BIT-1	1, 14:9 mode is available 0, 14:9 mode is not available	
BIT-0	1, 16:9 tube is used 0, 4:3 tube is used	

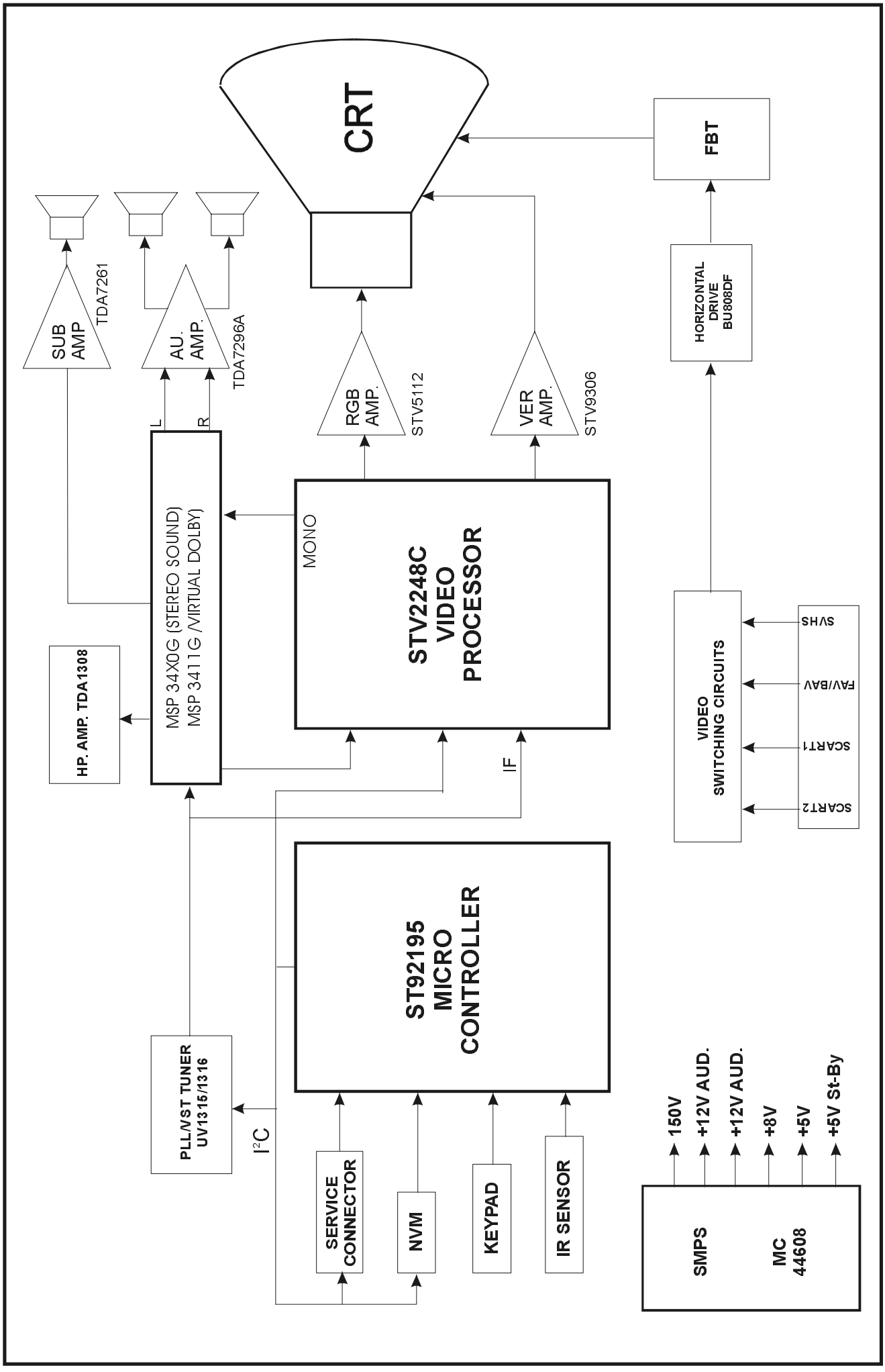
TUNER SETTINGS

	VHF1-VHF3	VHF3-UHF	AK30 SERVICE MENU ITEMS					
	Frq. (Mhz)	Frq. (Mhz)	F1H	F1L	F2H	F2L	BS1	B
Philips UV1316S MK3	156,25 MHz	441,25 MHz	00001100	00110010	00011110	00000010	00000001	0000
Thomson CTT5020	114,25 MHz	401,25 MHz	00001001	10010010	00011011	10000010	00000011	0000
Samsung TECC2949PG28B	170,25 MHz	465,25 MHz	00001101	00010010	00011111	10000010	00000001	0000
Samsung TECC2949PG35B	170,25 MHz	449,25 MHz	00001101	00010010	00011110	10000010	00000001	0000
Alps TEDE9X226A	142,25 MHz	425,25 MHz	00001011	01010010	00011101	00000010	00000001	0000
Alps TEDE9-004A	149,25 MHz	424,25 MHz	00001011	11000010	00011100	11110010	00000001	0000

Explanations	
F1H	High byte of VHF1-VHF3 cross-over frequency
F1L	Low byte of VHF1-VHF3 cross-over frequency
F2H	High byte of VHF3-UHF cross-over frequency
F2L	Low byte of VHF3-UHF cross-over frequency
BS1	Band switching byte for VHF1
BS2	Band switching byte for VHF3
BS3	Band switching byte for UHF
CB	Control byte

NOTE : In case of an EEPROM defect you do not need an original MASTER EEPROM to run the TV again. Because of a special feature of software, AK30 chassis works with an unprogrammed EEPROM. (Even without an EEPROM) In such kind of case service staff has to put a new EEPROMwith the same type on the chassis and adjust all the options according to MANUAL ADJUSTMENT PROCEDURE !

GENERAL BLOCK DIAGRAM OF CHASSIS AK37



AK37 / TITANIUM – Languages Groups

GROUP 1 - WEST

- ENGLISH
- FRENCH
- SWEDISH
- CZECH
- GERMAN
- PORTUGUESE
- ITALIAN
- RUMANIAN

GROUP 2 – WEST / EAST

- POLISH
- FRENCH
- SWEDISH
- CZECH
- GERMAN
- SERBIAN
- ITALIAN
- RUMANIAN

GROUP 3 – WEST / TURKEY

- ENGLISH
- FRENCH
- SWEDISH
- TURKISH
- GERMAN
- PORTUGUESE
- ITALIAN
- RUMANIAN

GROUP 4 – EAST / CYRILLIC

- ENGLISH
- CYRILLIC
- SWEDISH
- CZECH
- GERMAN
- SERBIAN
- LETTISH
- RUMANIAN

GROUP 5 - ARABIC

- ENGLAND
- FRENCH
- SWEDISH
- TURKISH
- GERMAN
- HEBREW
- ITALIAN
- ARABIC

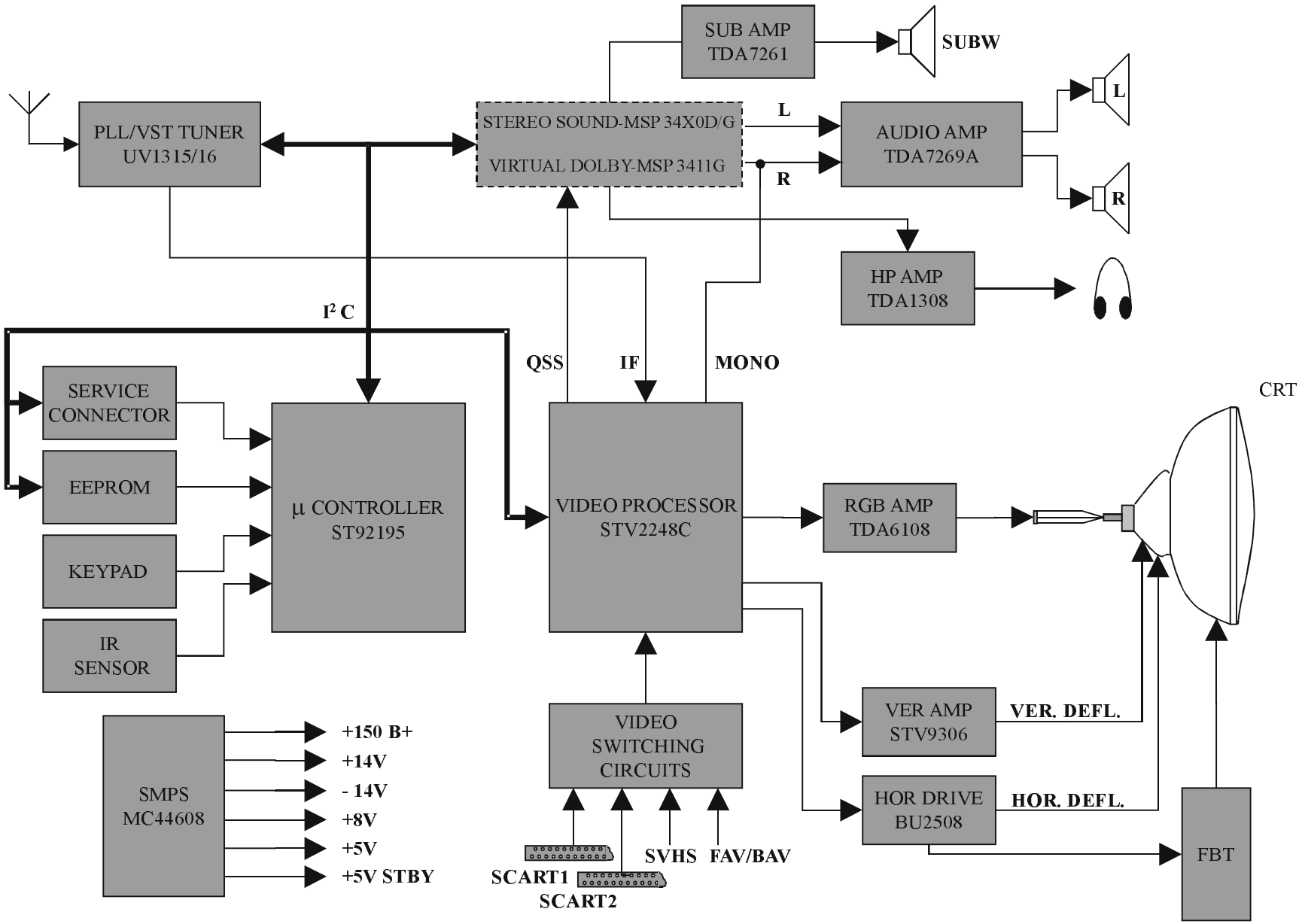
Using Remote Control Buttons

RED : Is used to switch AVL to ON or OFF mode on service menu.
GREEN : Is used to enter the geometry menu.
YELLOW : Is used to prepare the system for screen adjustments.
BLUE : Is used for automatic IF and AGC adjustments.
TTX Update : Is used to change the picture mode.

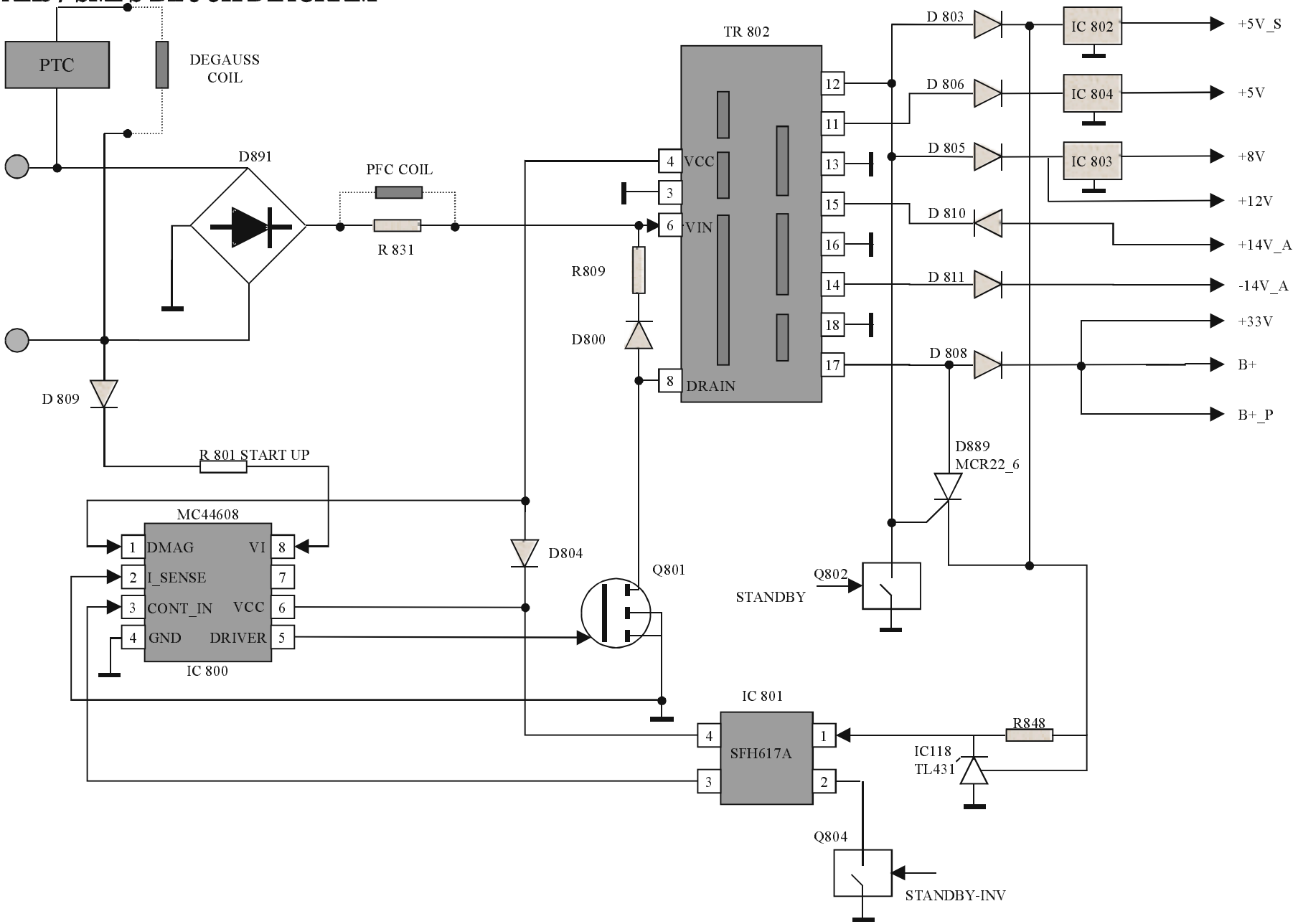
FEATURES

•It is a remote controlled colour television
•100 programmes from VHF, UHF bands or cable channels can be preset
•It can tune cable channels
•Controlling the TV is very easy by its menu driven system
•It has Euroconnector* socket for external devices (such as computer, video, video games, audio set, etc.)
•A second Euroconnector* socket is available
•Stereo sound systems* (German, Nicam or German+Nicam) are available
•Virtual Dolby/3D Panorama*
•Full function Teletext* (Fastext, Toptext)
•It is possible to connect headphone*
•Direct channel access*
•A.P.S.* (Automatic Programming System)
•All programmes can be named.
•Programme swapping between last watched two programmes.
•Forward or backward automatic tuning.
•Sleep timer.
•Automatic sound mute when no transmission.
•When no valid signal is detected, after 5 minutes the TV switches itself automaticall to stand-by mode.
•WSS* (Wide Screen Signalling)
•NTSC Playback*
•Front or Back SVHS* is available
•Back AV in and Back AV out or Front AV in or Front AV in and Back AV our is available*
•It is possible to connect external speaker*

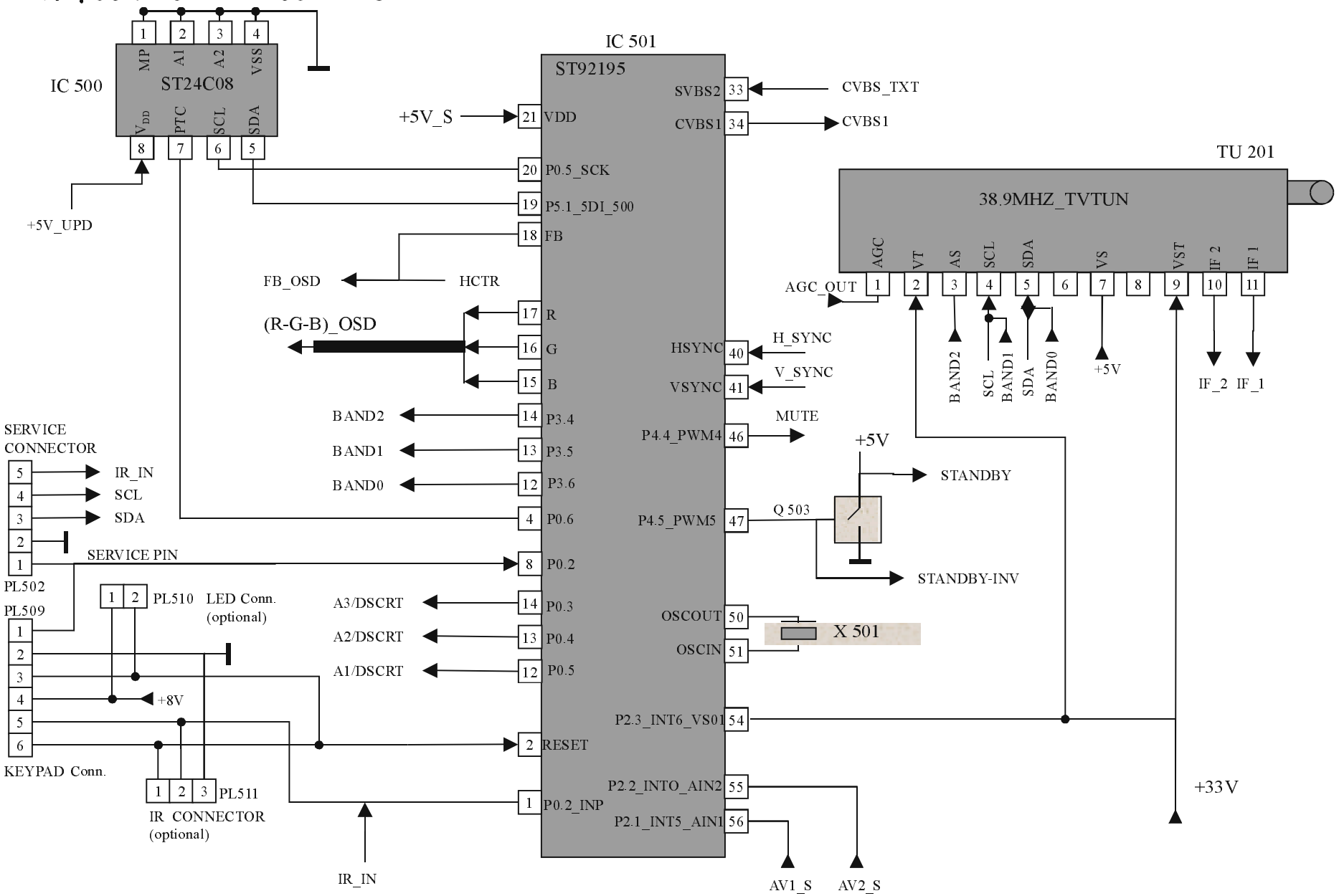
AK37 BLOCK DIAGRAM



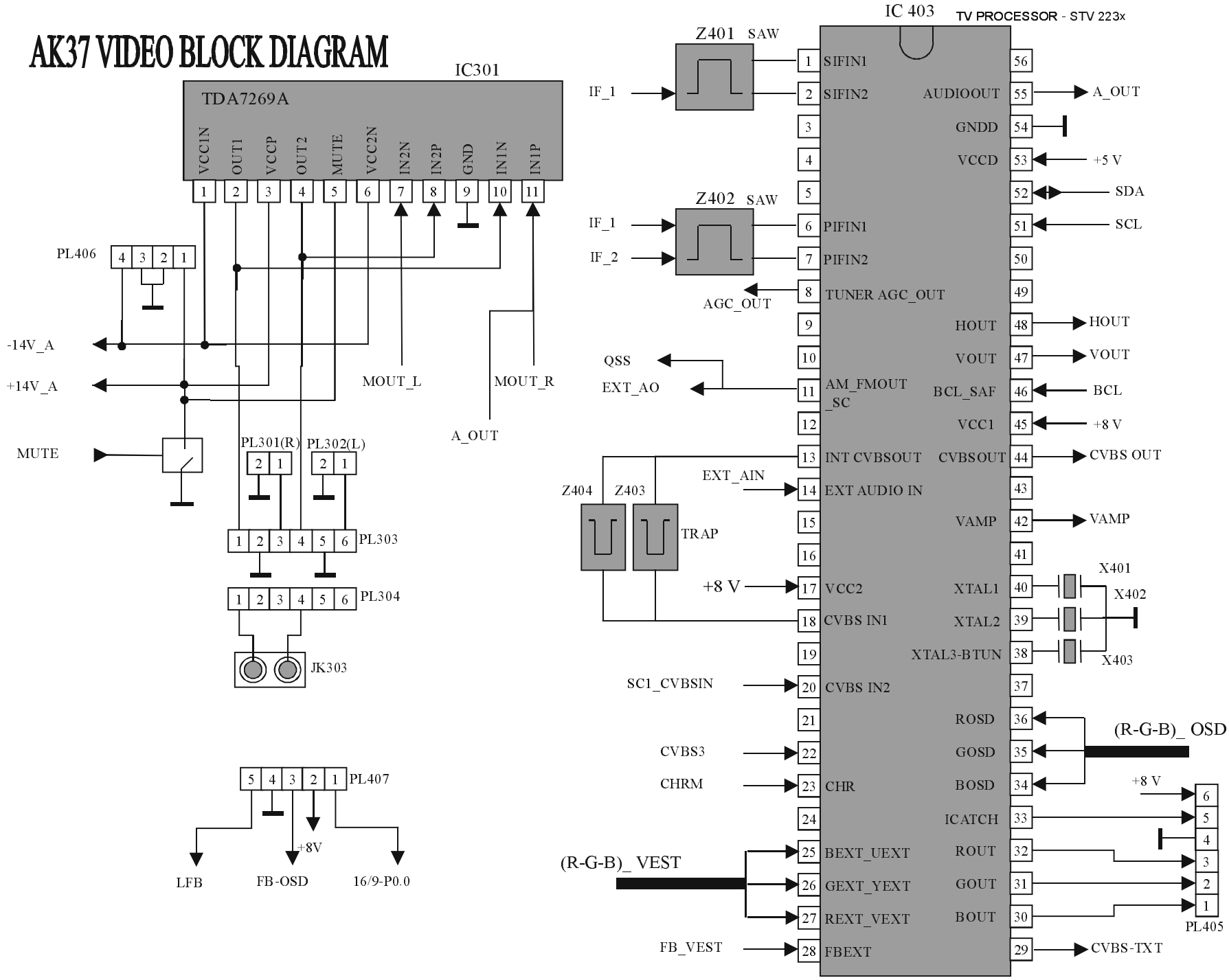
AK37 SMPS BLOCK DIAGRAM



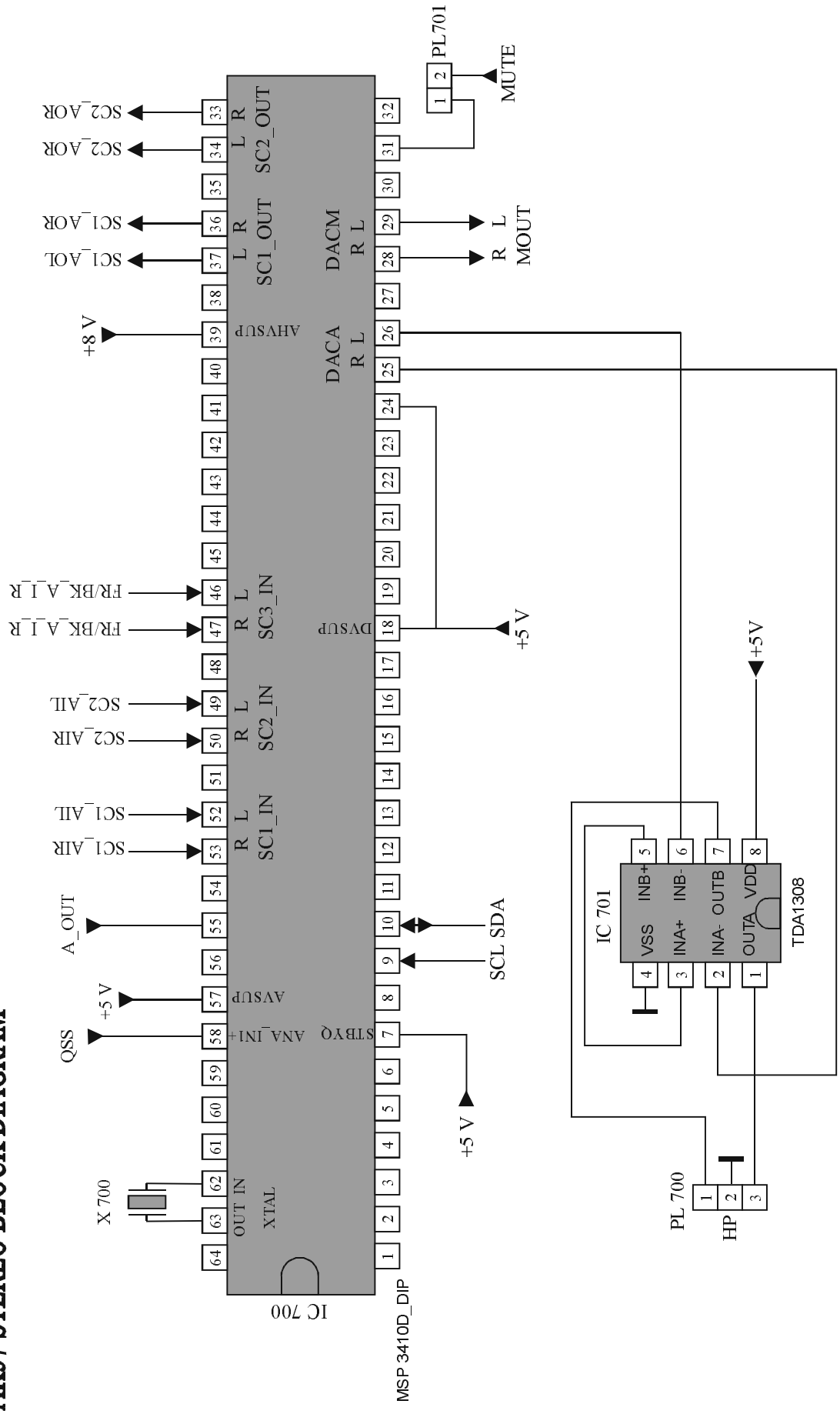
AK37 µCONTROLLER BLOCK DIAGRAM



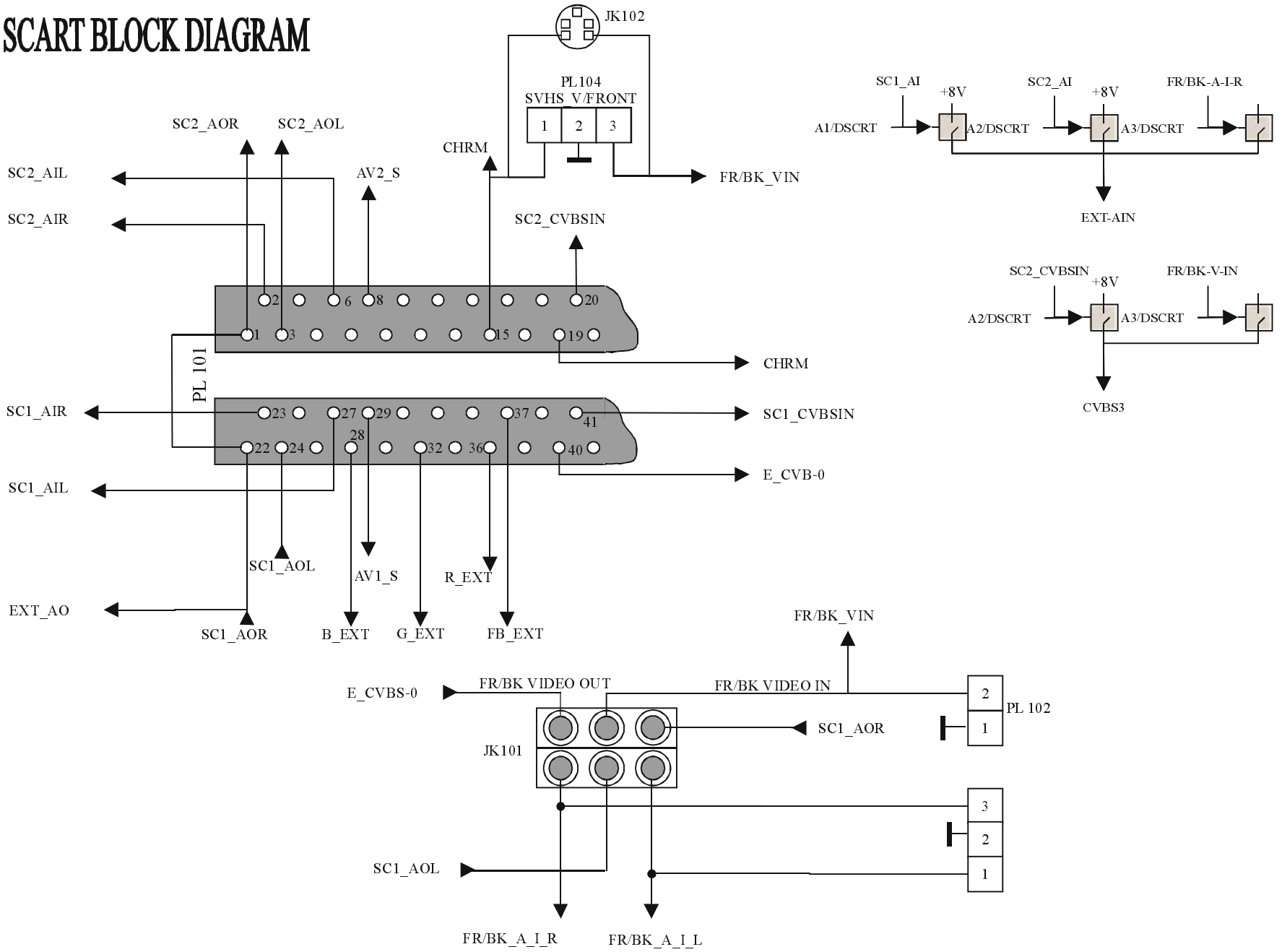
AK37 VIDEO BLOCK DIAGRAM



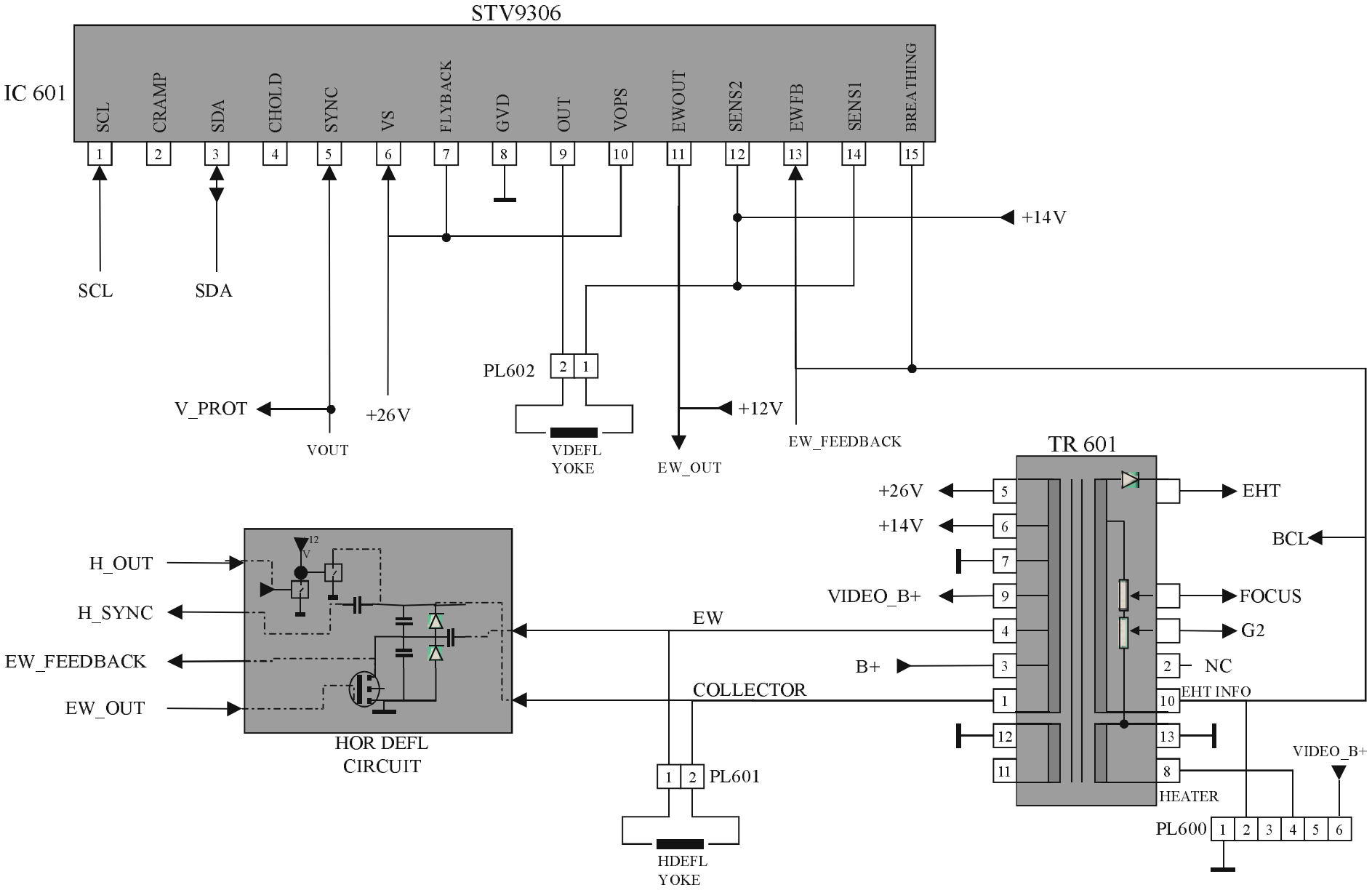
AK37 STEREO BLOCK DIAGRAM



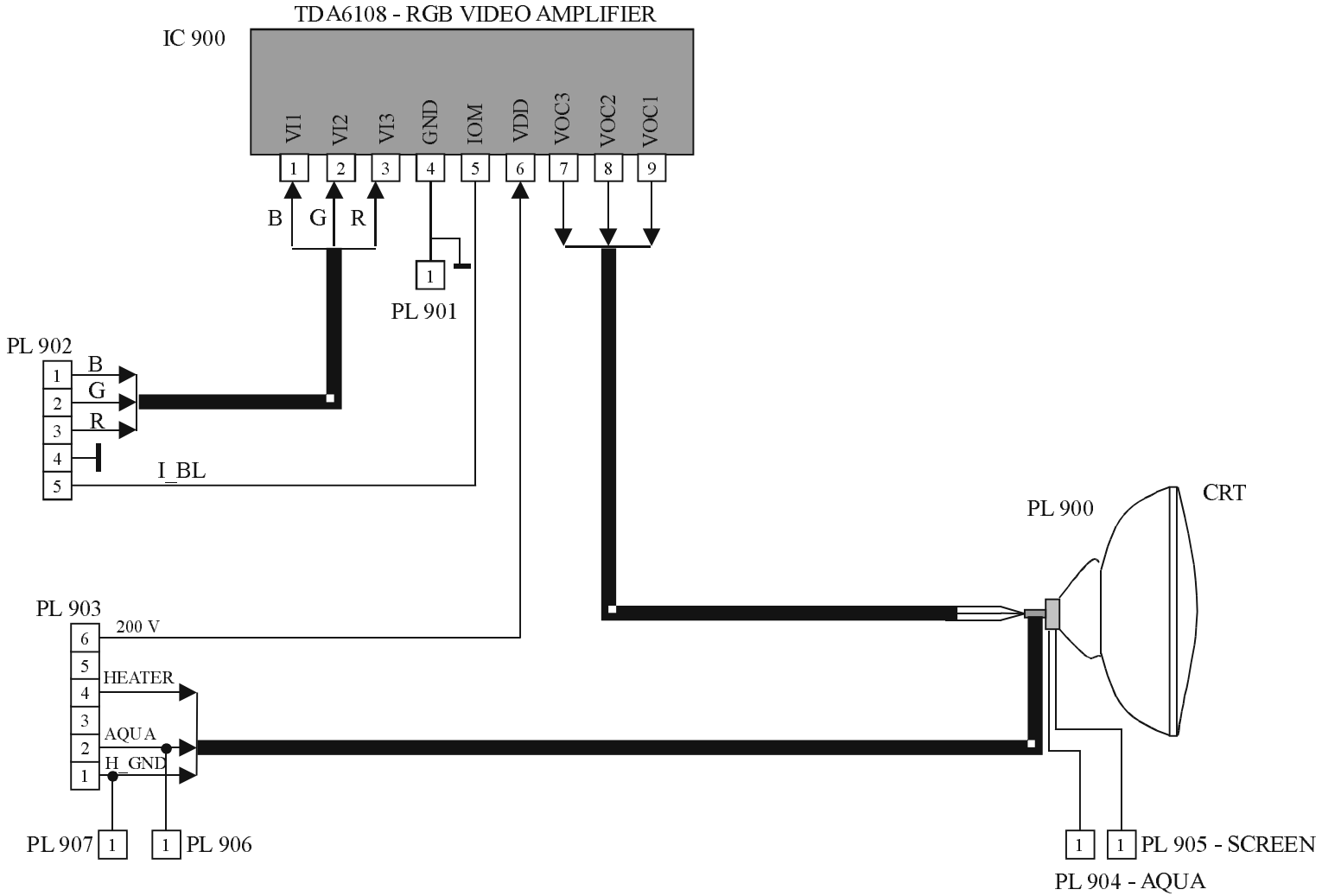
AK37 SCART BLOCK DIAGRAM

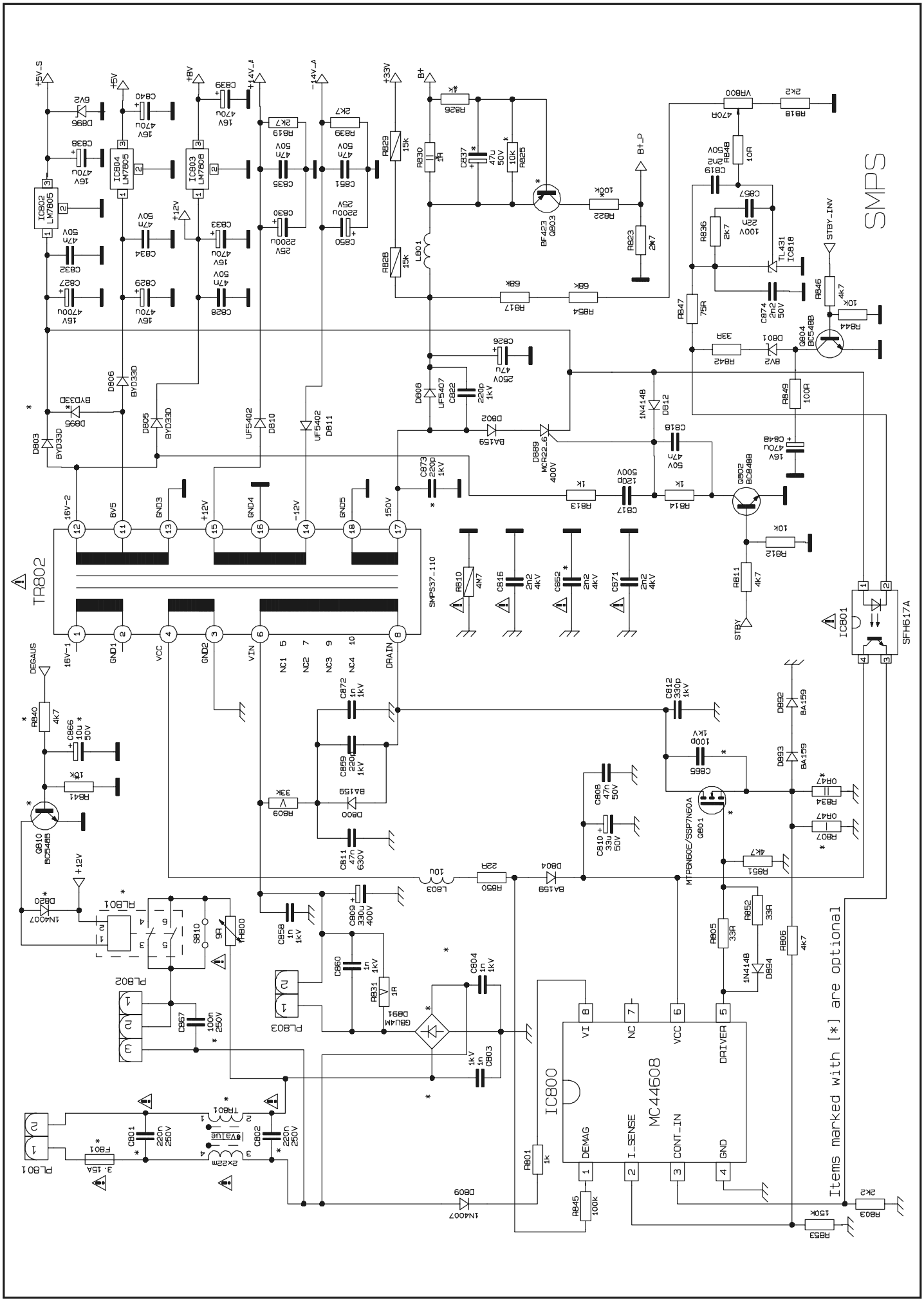


AK37 DEFLECTION BLOCK DIAGRAM

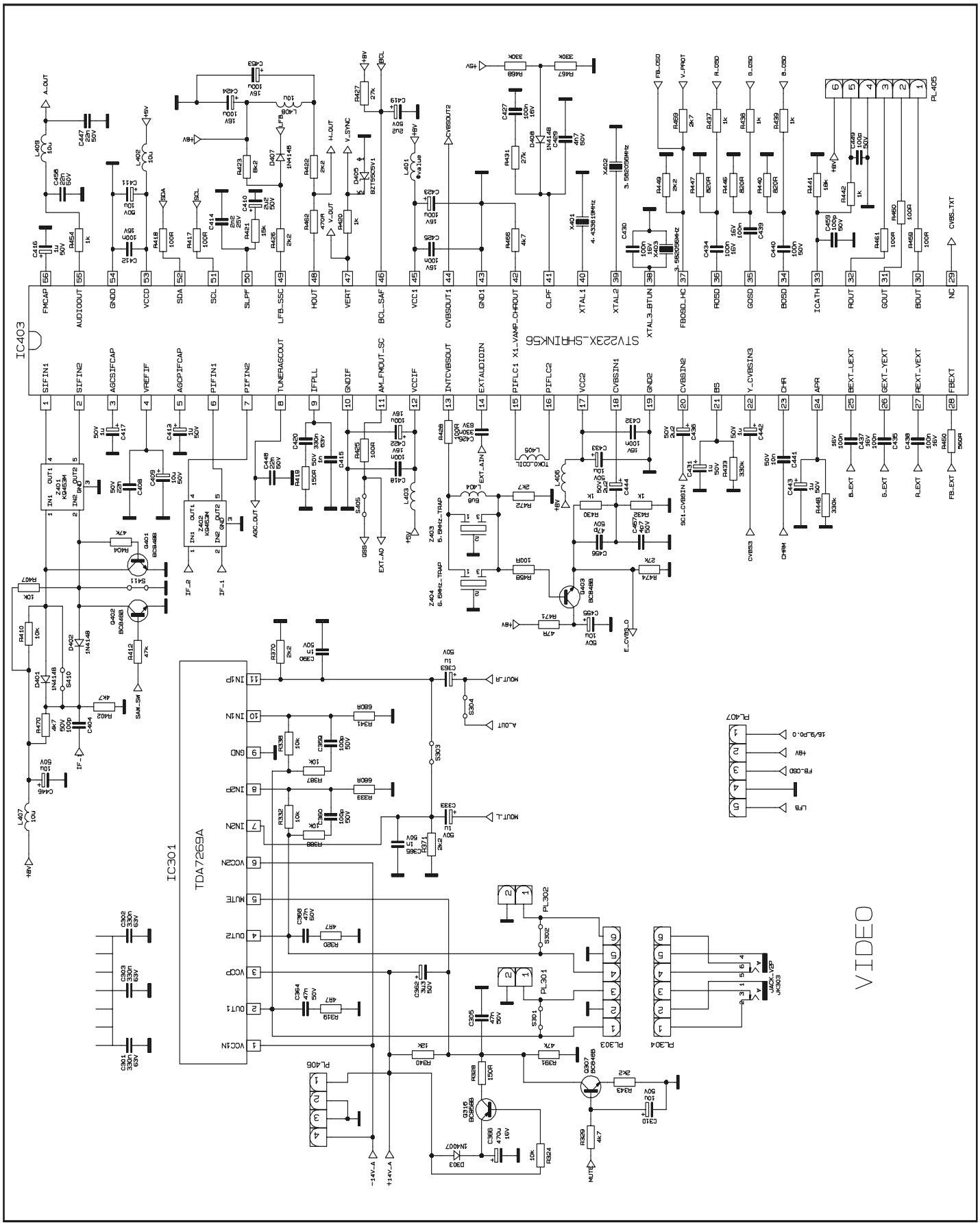


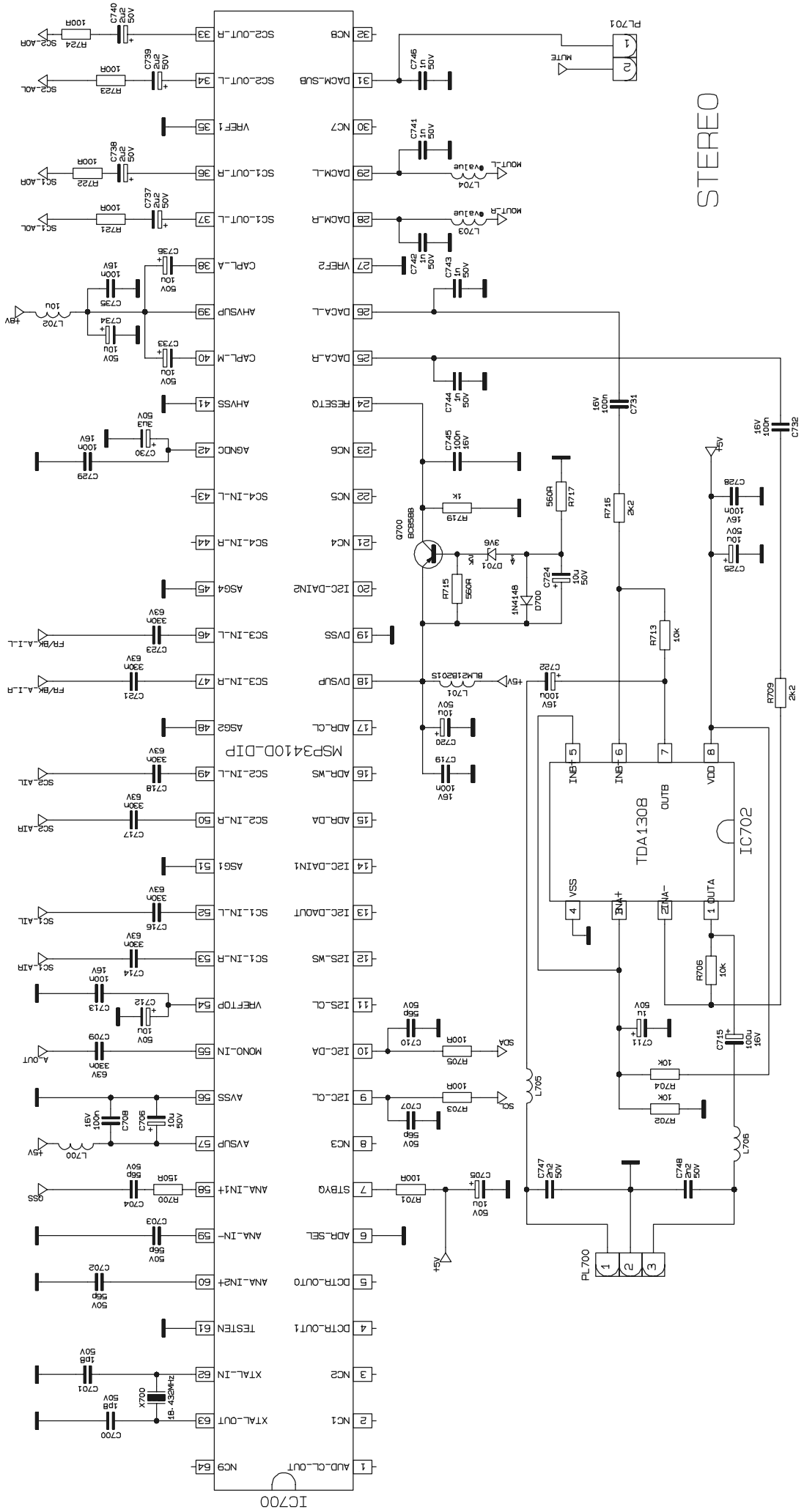
AK37 BASE BOARD BLOCK DIAGRAM

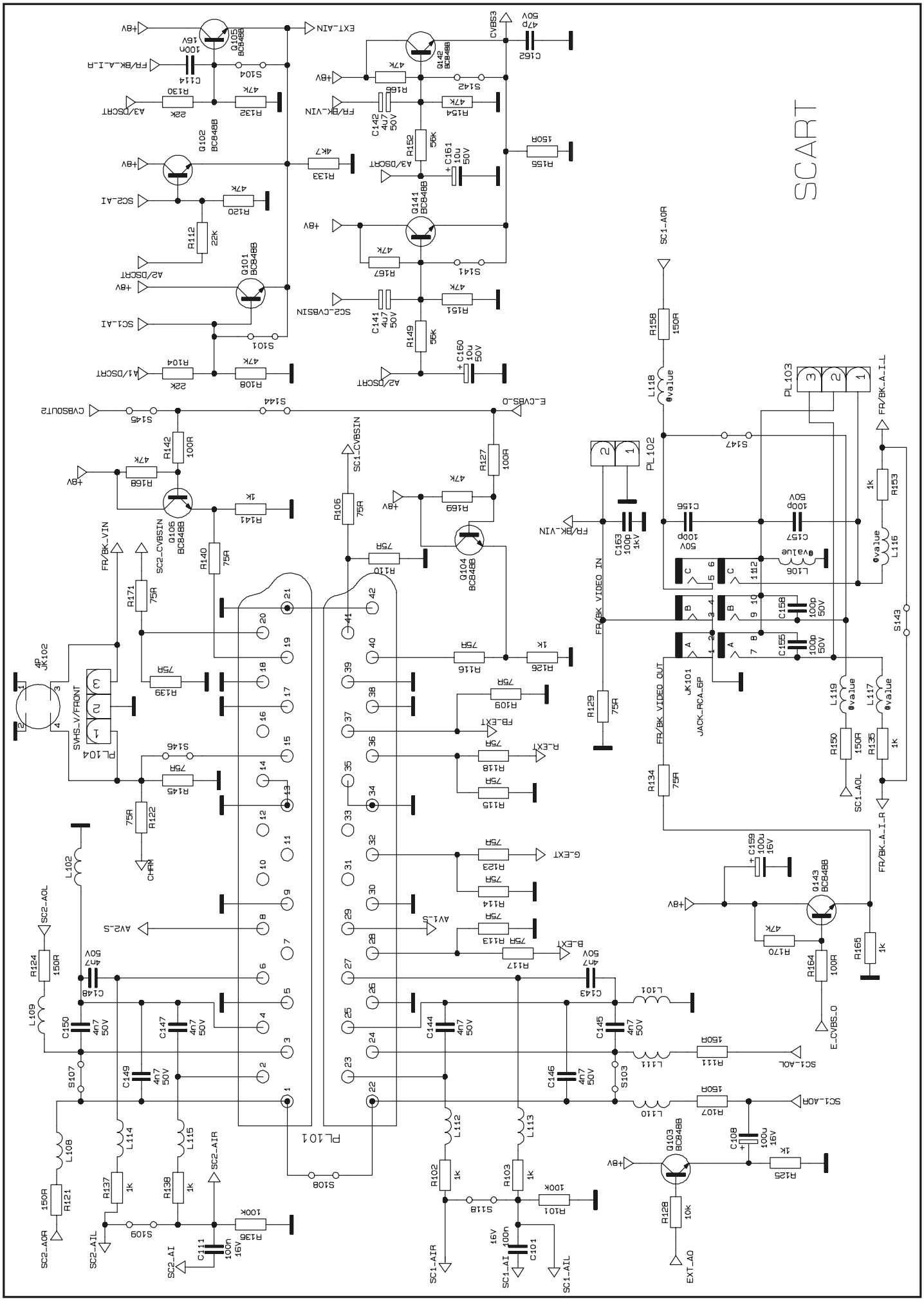


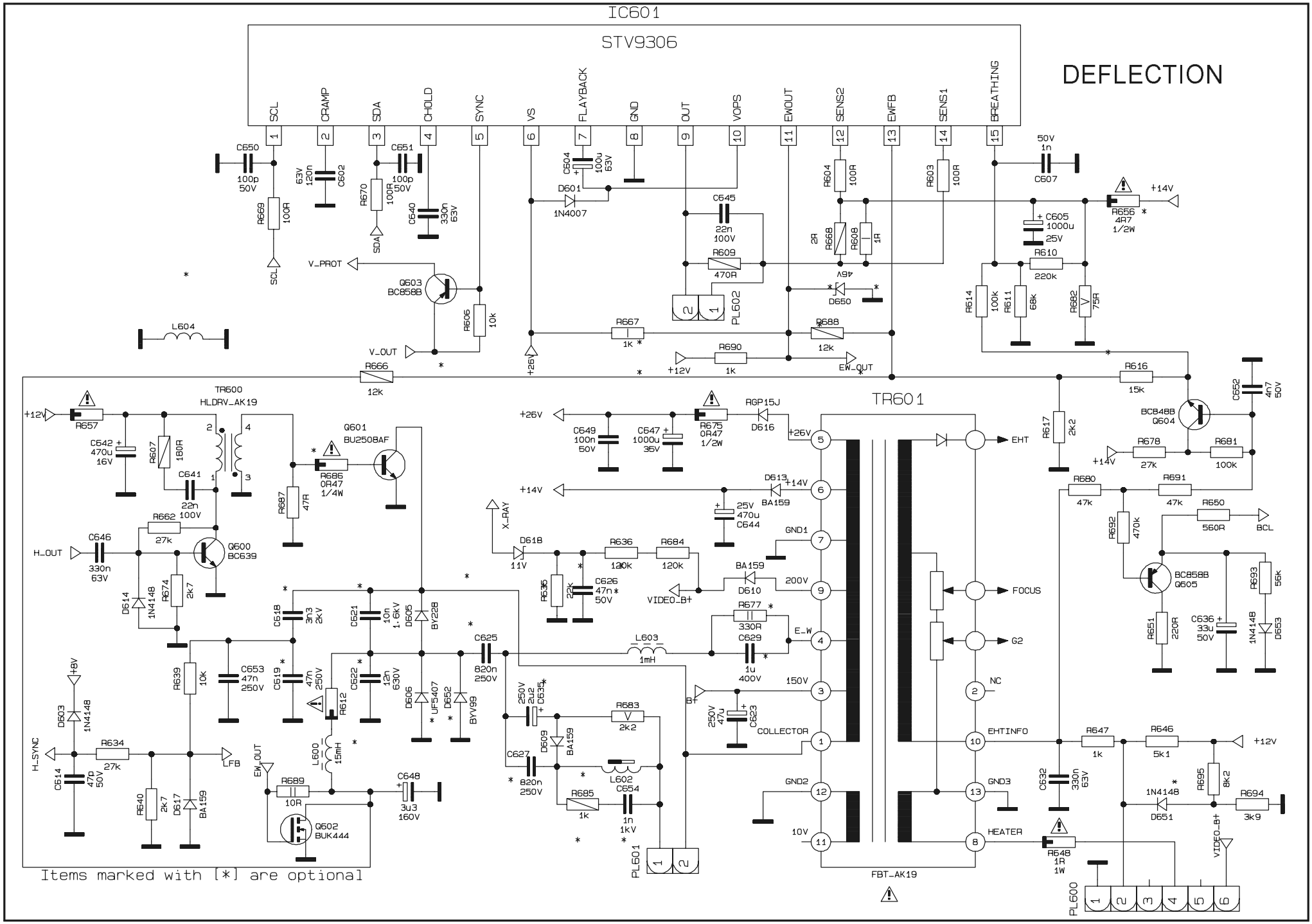

SMPS
TR802
SMPS37-110
IC800
MC44608
VI
NC
VCC
DRIVER
DEMAG
I-SENSE
CONT_IN
GND
IC801
SFH617A
MTP8N60E/SSP7N60A
Items marked with [*] are optional

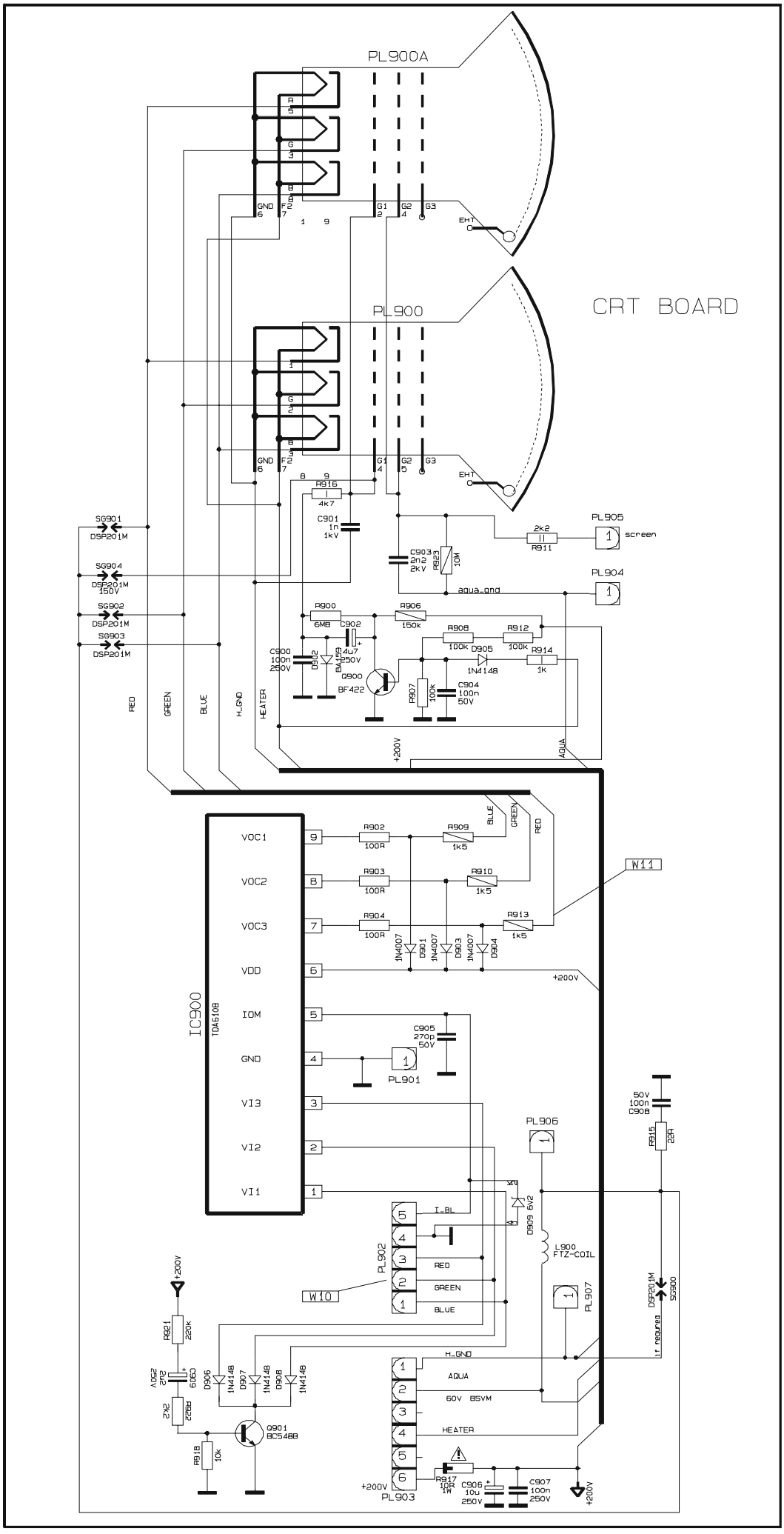
MICRO CONTRO
ST92195
IC501
ST24C08
IC500
TU201
38.9MHz_T
SERVICE CONNECTOR
PL502
SERVICE PIN
PL503
PL504
PL509
PL510
PL511
BAND2
BAND1
BAND0
HCTR
MUTE
STBY
STBY_INV
AGC_OUT
SDA
SCL
IR_IN
+5V
+8V
+33V
+5V_S
+8V_S
+33V_S
TXCF
CVBS0
AVDD2
JTMS
SVBS2
CVBS1
AGND
GND
JTRSTO
PXFM
AVDD1
HSYNC
VSYNC
P0.4_PWM0
P4.1_PWM1
P4.2_PWM2
P4.3_PWM3_TSLU
P4.7_CSO_RESERA.4_PWM4
P4.5_PWM5
P4.6_PWM6
P4.7_PWM7
OSCOUT
OSCIN
P0P8.5_INT4_AIN3_VSO2
P2.4_NMI
P2.3_INT6_VSO1
P2.2_INT0_AIN2
P2.1_INT5_AIN1
P0.2_INP2
JUTCK
MCFM
TESTO
AVDD3
WSCR
WSCF
JTO
VDD
P0.5_SCK
P5.1_SDI_SDO
FB
R
G
B
P3.4
P3.5
P3.6
P3.7_CSO_RESER
P0.0
P0.1
P0.2
P0.3
P0.4
P0.6
P0.7
RESET
P0.2_INP2
1N4148
BC858B
BC848B
BF240
BF422
BF423
BF420
BF421
BF422
BF423
BF420
BF421


VIDEO
IC403
STV2234_SHRINK56
IC301
TDA7269A


STEREO
MSP3410D_DIP
IC700
TDA1308
IC702
PL701
PL700
MUTE
SCL
SDA
+5V
+8V
SC2_AOR
SC2_AOL
SC1_AOR
SC1_AOL
A_OUT
SC2_AIL
SC2_AIR
SC1_AIL
SC1_AIR
FR/BK_A_I_L
FR/BK_A_I_R
Q5S
SC2_OUT_R
SC2_OUT_L
SC1_OUT_R
SC1_OUT_L
SC4_IN_L
SC4_IN_R
SC3_IN_L
SC3_IN_R
SC2_IN_L
SC2_IN_R
SC1_IN_L
SC1_IN_R
MONO_IN
ANA_IN1+
ANA_IN-
ANA_IN2+
TESTEN
XTAL_IN
XTAL_OUT
NC9
AUD_CL_OUT
NC1
NC2
DCTR_OUT1
DCTR_OUT0
ADR_SEL
STBYQ
NC3
AVSUP
AVSS
I2C_CL
I2C_DA
I2S_CL
I2S_WS
I2C_DAOUT
I2C_DAIN1
ADR_DA
ADR_WS
ADR_CL
ASG2
DVSUP
DVSS
I2C_DAIN2
NC4
NC5
NC6
RESETQ
DACA_R
DACA_L
VREF2
DACM_R
DACM_L
NC7
DACM_SUB
NC8
VREF1
CAPL_A
CAPL_M
AHVSUP
AHVSS
AGNDC
ASG4
ASG1
MOUT_L
MOUT_R
value
BC858B
BLM21B201S
1N4148
BCB858B
3V6
BLM21B201S
INB+
INB-
VDD
OUTB
VSS
INA+
INA-
OUTA


SCART
PL101
PL102
PL103
PL104
JK101
JK102
JACK_RCA_6P
SVHS_V/FRONT
FR/BK_VIN
FR/BK_VIDEO_IN
FR/BK_VIDEO_OUT
SC1_CVBSIN
SC2_CVBSIN
E_CVBS_O
CVBSOUT2
EXT_AIN
SC1_AOR
SC1_AOL
SC1_AOR
SC2_AOL
SC2_AOR
SC1_AIR
SC1_AIL
SC2_AIR
SC2_AIL
FR/BK_A_I_R
FR/BK_A_I_L
R_EXT
G_EXT
B_EXT
FB_EXT
AV1_S
AV2_S
CHRM
EXT_AO
+8V
A1/DSCRT
A2/DSCRT
A3/DSCRT
SC1_AI
SC2_AI
SC1_AIR
SC1_AIL
SC2_AIR
SC2_AIL
SC2_CVBSIN
FR/BK_VIN
FR/BK_VIDEO_IN
FR/BK_VIDEO_OUT
E_CVBS_O
SC1_AOL
SC1_AOR
EXT_AO

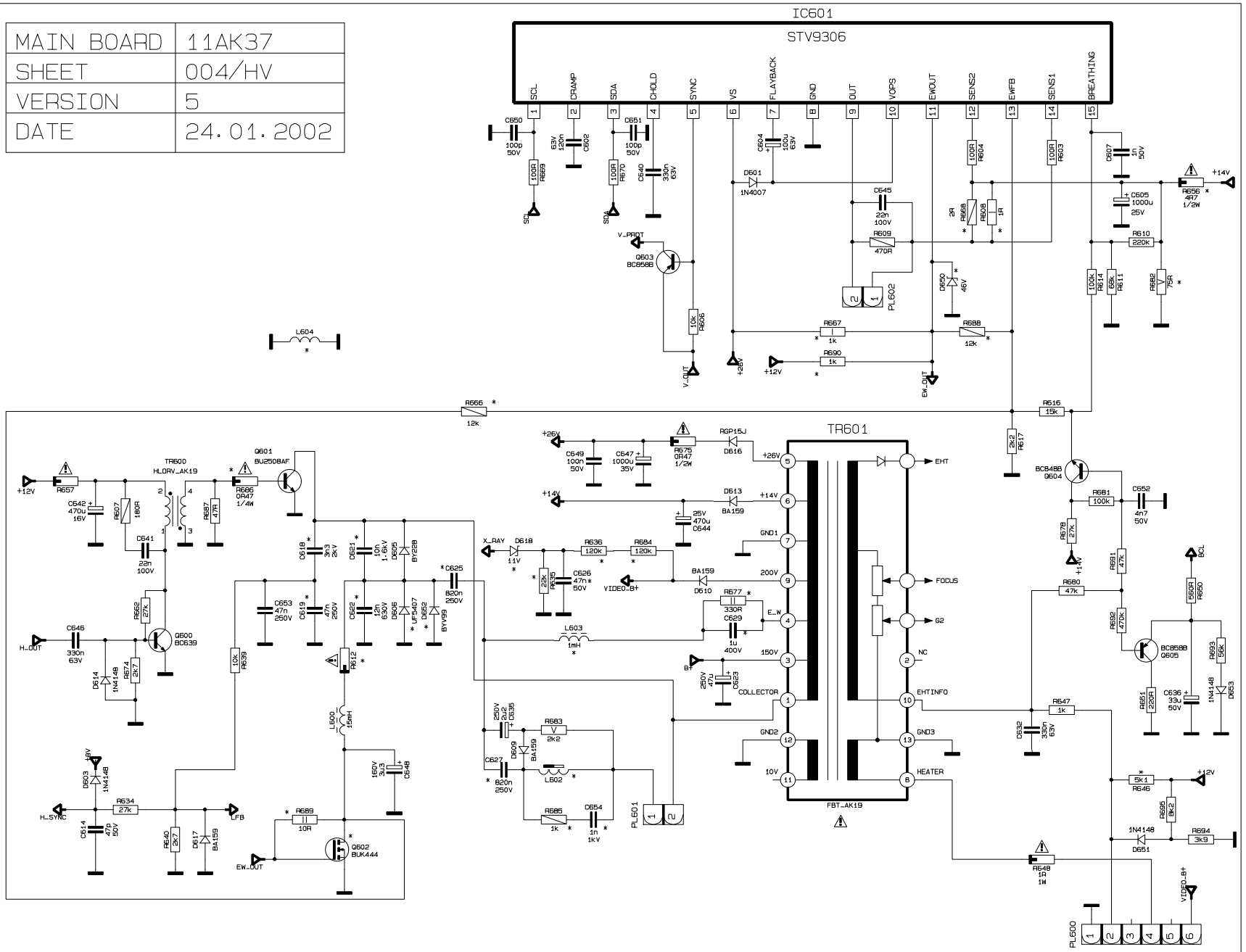

DEFLECTION
IC601
STV9306
SCL
CRAMP
SDA
CHOLD
SYNC
VS
FLAYBACK
GND
OUT
VOPS
EWOUT
SENS2
EWFB
SENS1
BREATHING
TR600
HLDRV_AK19
TR601
Q601
BU2508AF
Q600
BC639
Q602
BUK444
Q603
BC858B
Q604
BC848B
Q605
BC858B
D601
1N4007
D610
BA159
D613
BA159
D616
RGP15J
D650
46V
D651
1N4148
PL600
PL601
PL602
L600
15mH
L602
L603
1mH
L604
EHT
FOCUS
G2
NC
EHTINFO
GND3
HEATER
COLLECTOR
FBT_AK19
X_RAY
VIDEO_B+
H_OUT
H_SYNC
LFB
EW_OUT
V_PROT
V_OUT
EW_OUT
BCL
Items marked with [*] are optional


CRT BOARD
PL900A
PL900
GND
G1
G2
G3
EHT
SG901
SG904
SG902
SG903
DSP201M
R916
4k7
C901
1n
1kV
C903
2n2
2kV
R823
10M
2k2
R911
PL905
screen
PL904
aqua_gnd
R900
6M8
C902
4u7
250V
R906
150k
R908
100k
R912
100k
R914
1k
D905
1N4148
C900
100n
250V
D902
BA159
Q900
BF422
R907
100k
C904
100n
50V
RED
GREEN
BLUE
H_GND
HEATER
+200V
AQUA
IC900
TDA6108
VOC1
VOC2
VOC3
VDD
IOM
GND
VI3
VI2
VI1
R902
100R
R903
100R
R904
100R
R909
1k5
R910
1k5
R913
1k5
W11
D901
D903
D904
C905
270p
50V
PL901
PL906
50V
100n
C908
R915
22R
PL902
I_BL
RED
GREEN
BLUE
W10
D909 6V2
L900
FTZ-COIL
PL907
R921
220k
C909
22u
25V
R922
2k2
D906
D907
D908
Q901
BC548B
R918
10k
H_GND
AQUA
60V BSVM
HEATER
PL903
R917
10R
1W
C906
10u
250V
C907
100n
250V

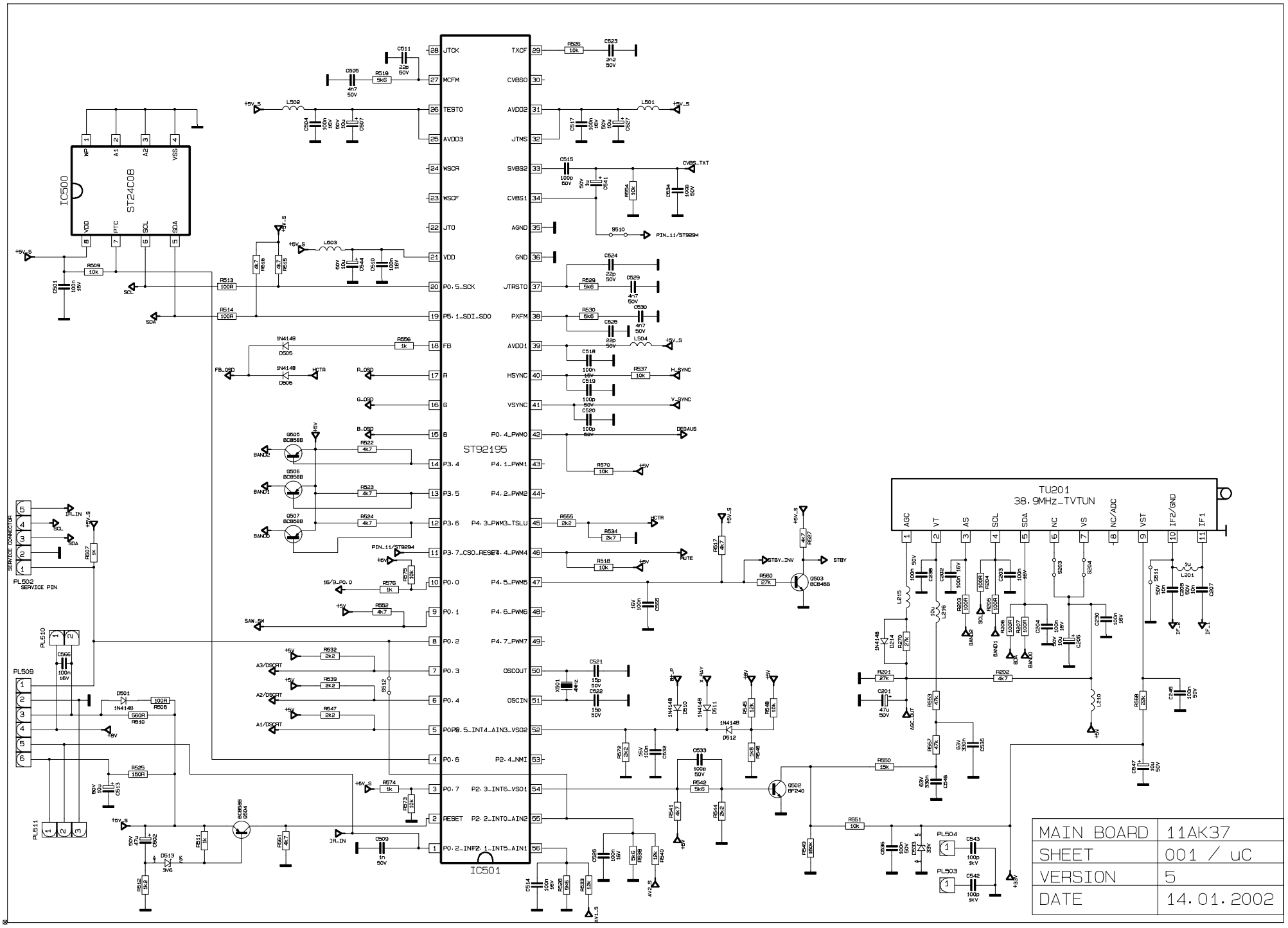
Schematics

11AK37-5

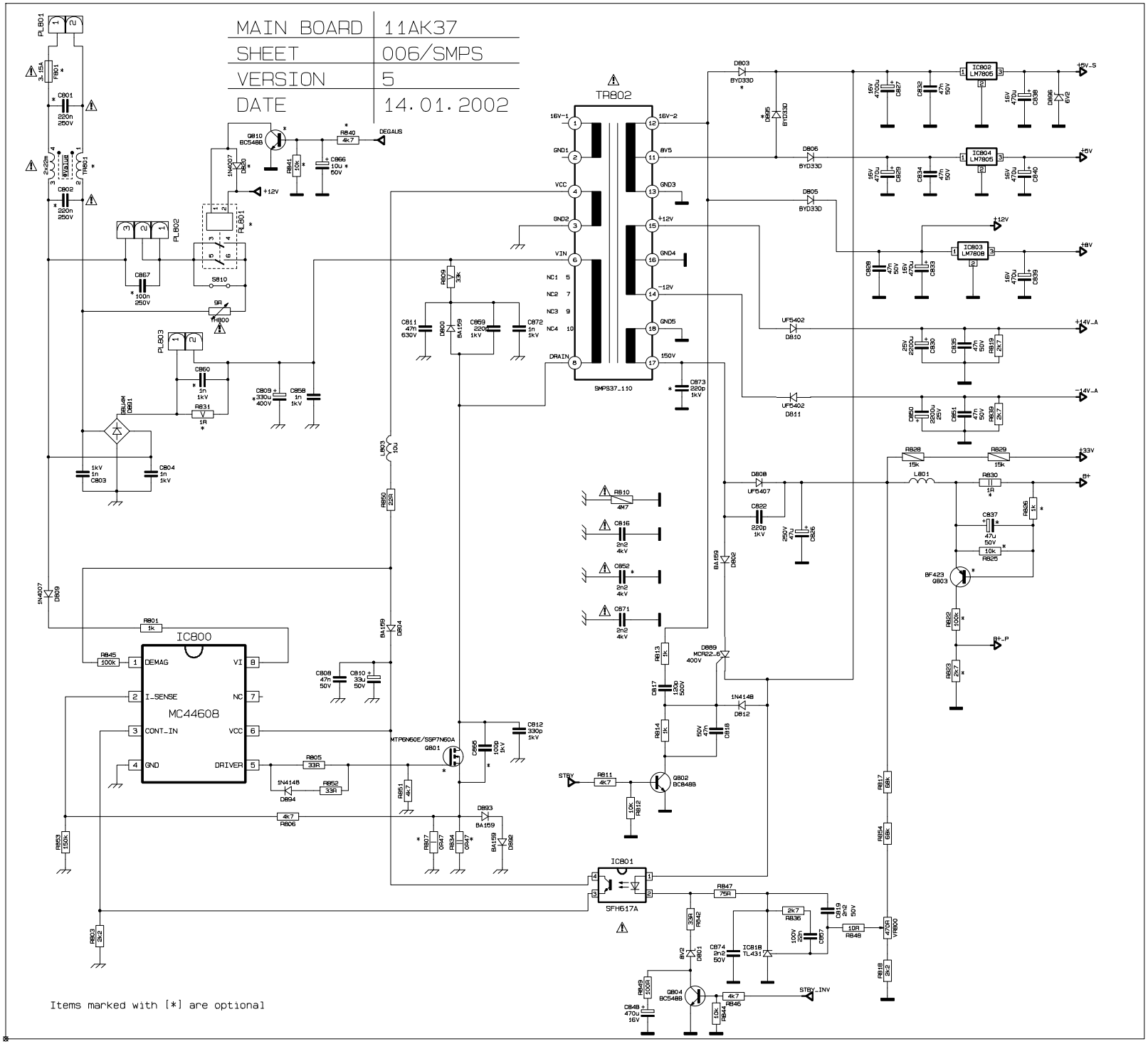
MAIN BOARD	11AK37
SHEET	004/HV
VERSION	5
DATE	24.01.2002

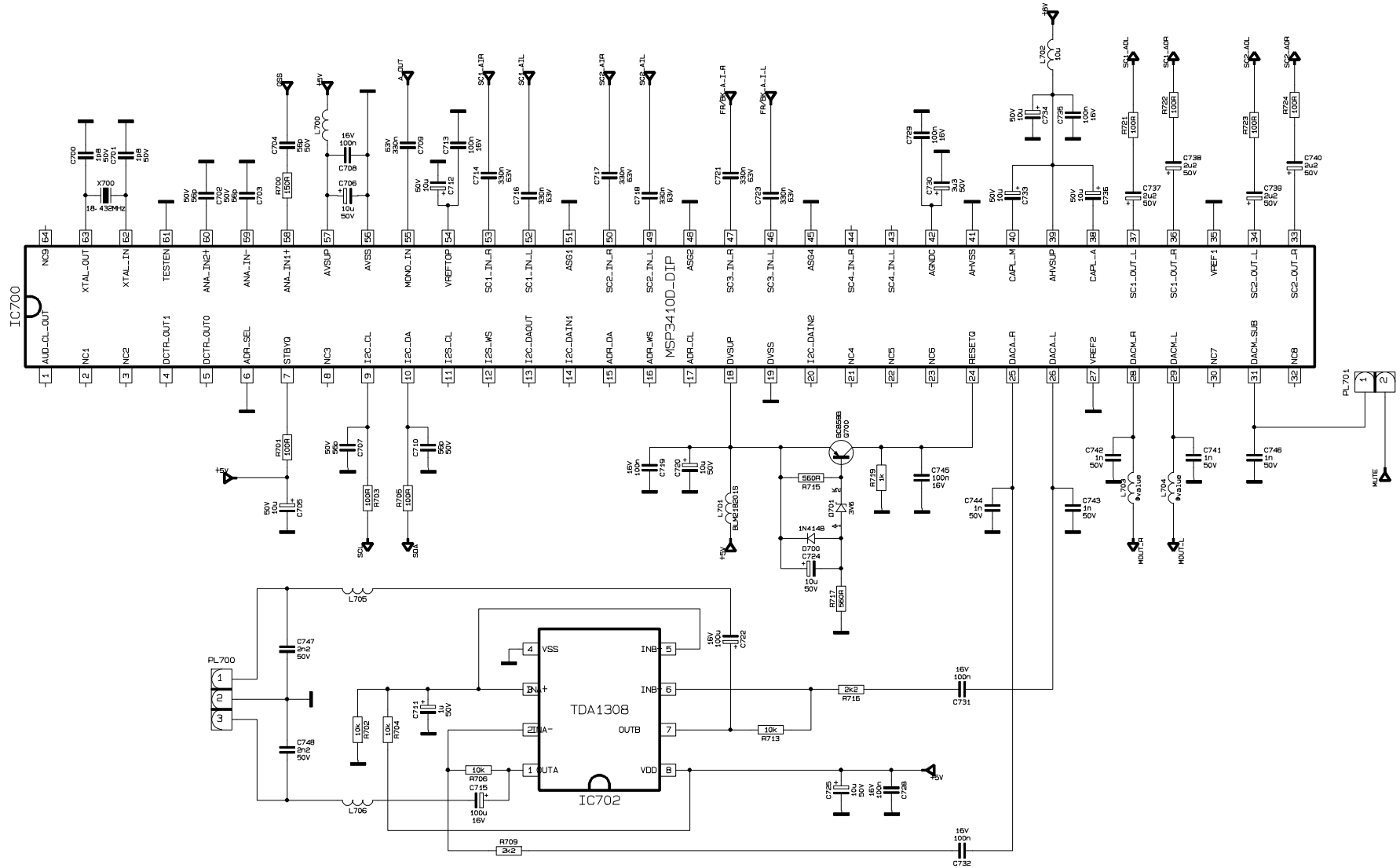


Items marked with (*) are optional


IC500
ST24C08
IC501
ST92195
TU201
38.9MHz_TVTUN
SERVICE CONNECTOR
PL502
SERVICE PIN
MAIN BOARD 11AK37
SHEET 001 / uC
VERSION 5
DATE 14.01.2002

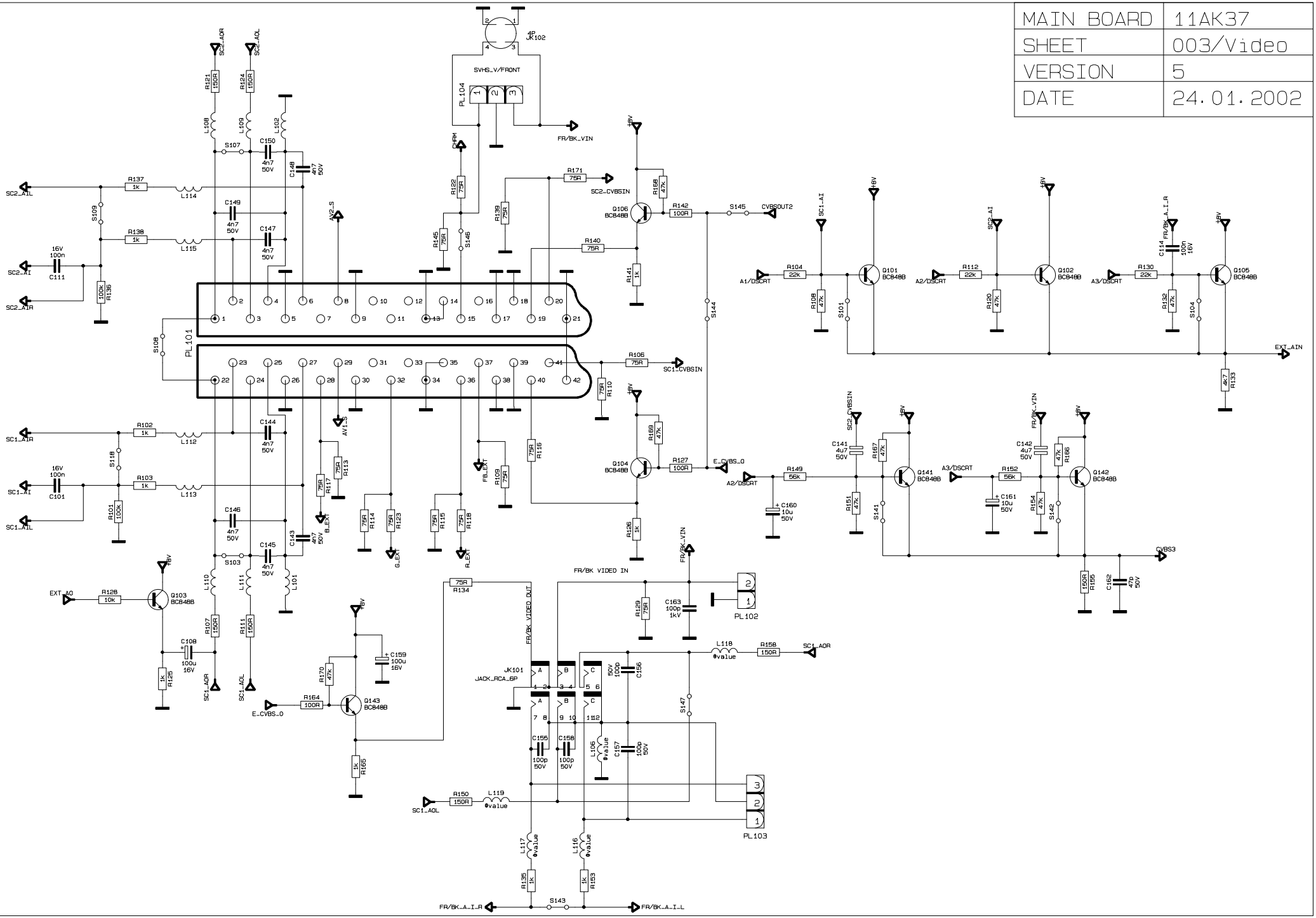
MAIN BOARD	11AK37
SHEET	006/SMPS
VERSION	5
DATE	14.01.2002



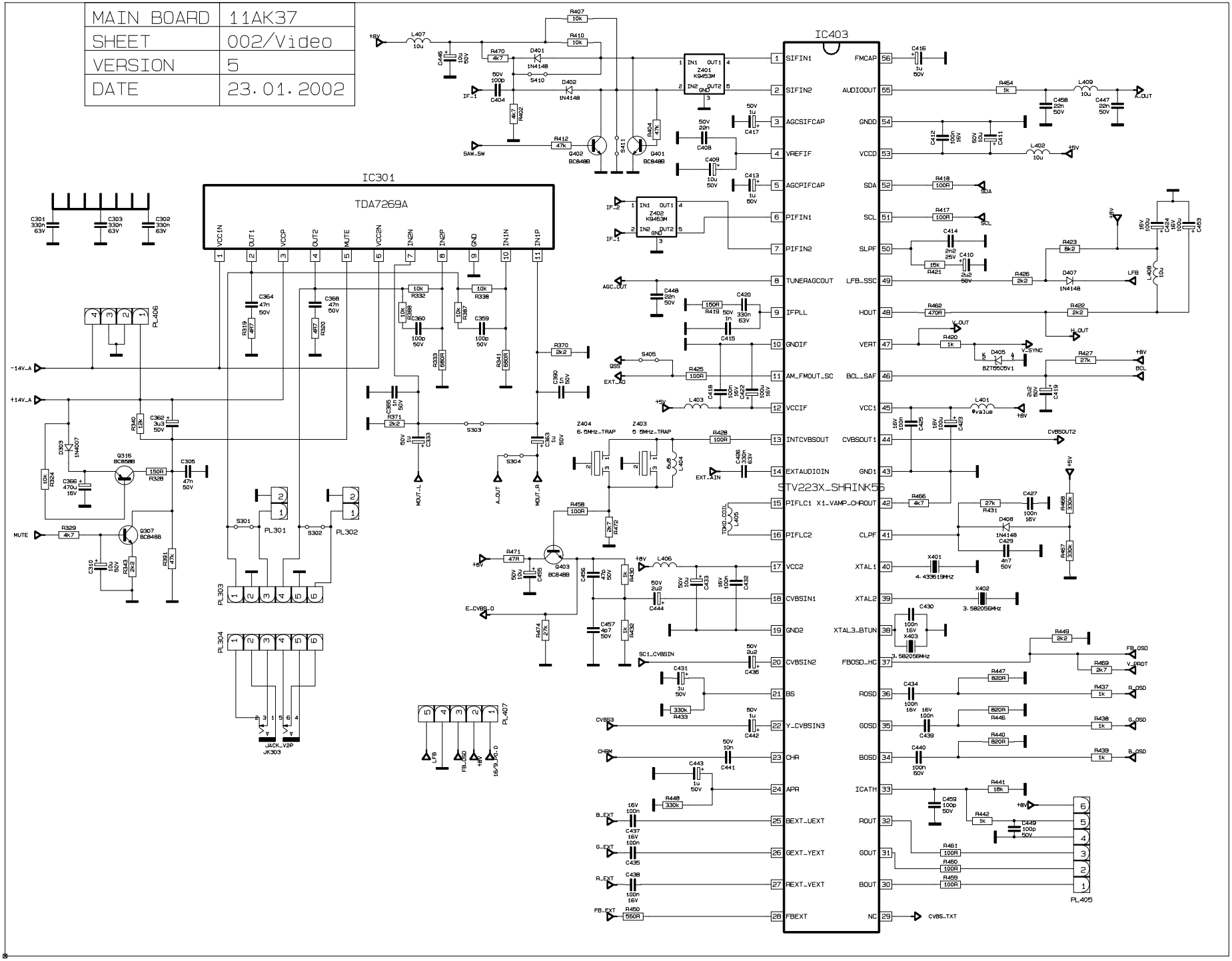


MAIN BOARD	11AK37
SHEET	007/Stereo
VERSION	5
DATE	14.01.2002

MAIN BOARD	11AK37
SHEET	003/Video
VERSION	5
DATE	24.01.2002

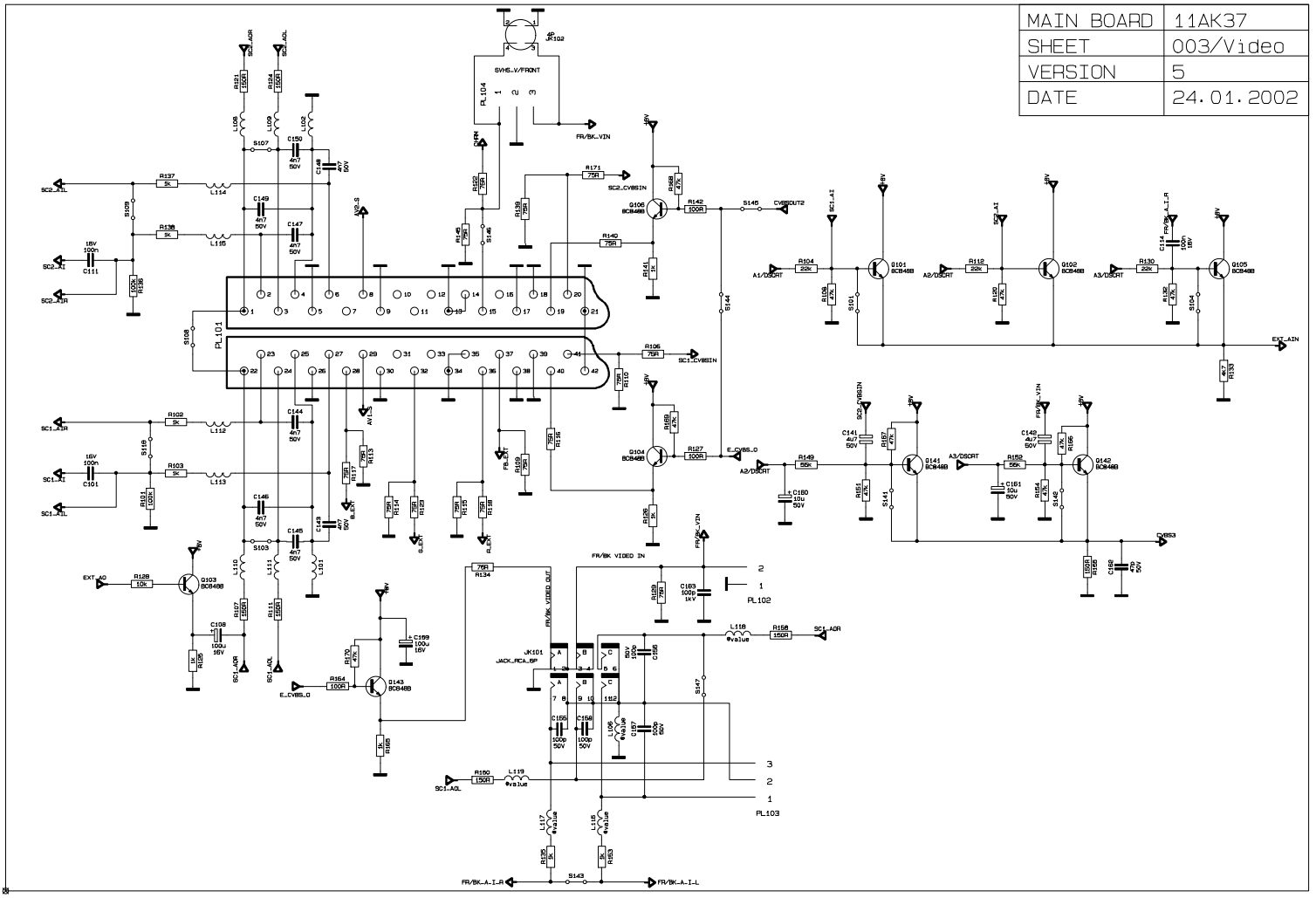


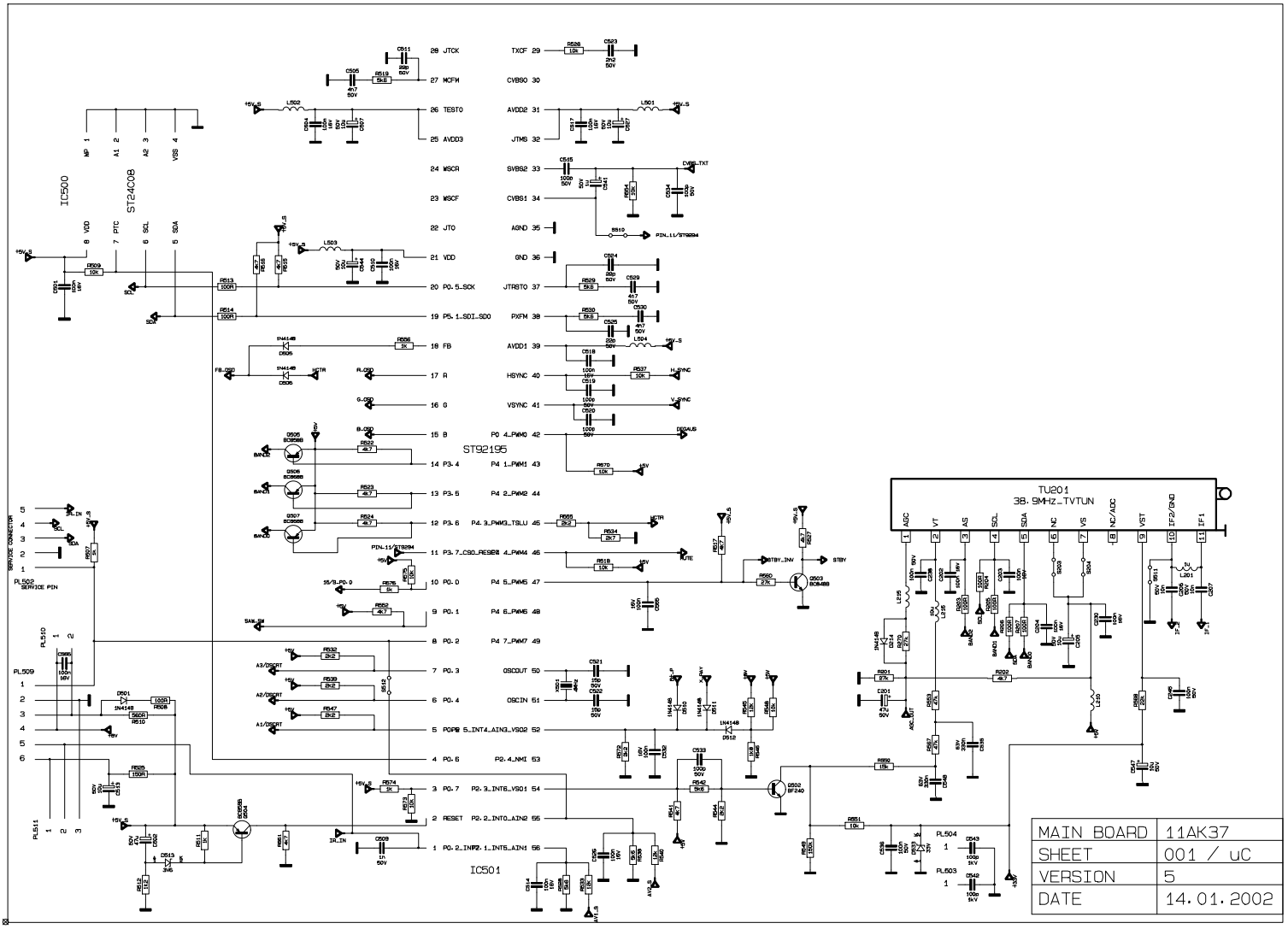
MAIN BOARD	11AK37
SHEET	002/Video
VERSION	5
DATE	23.01.2002

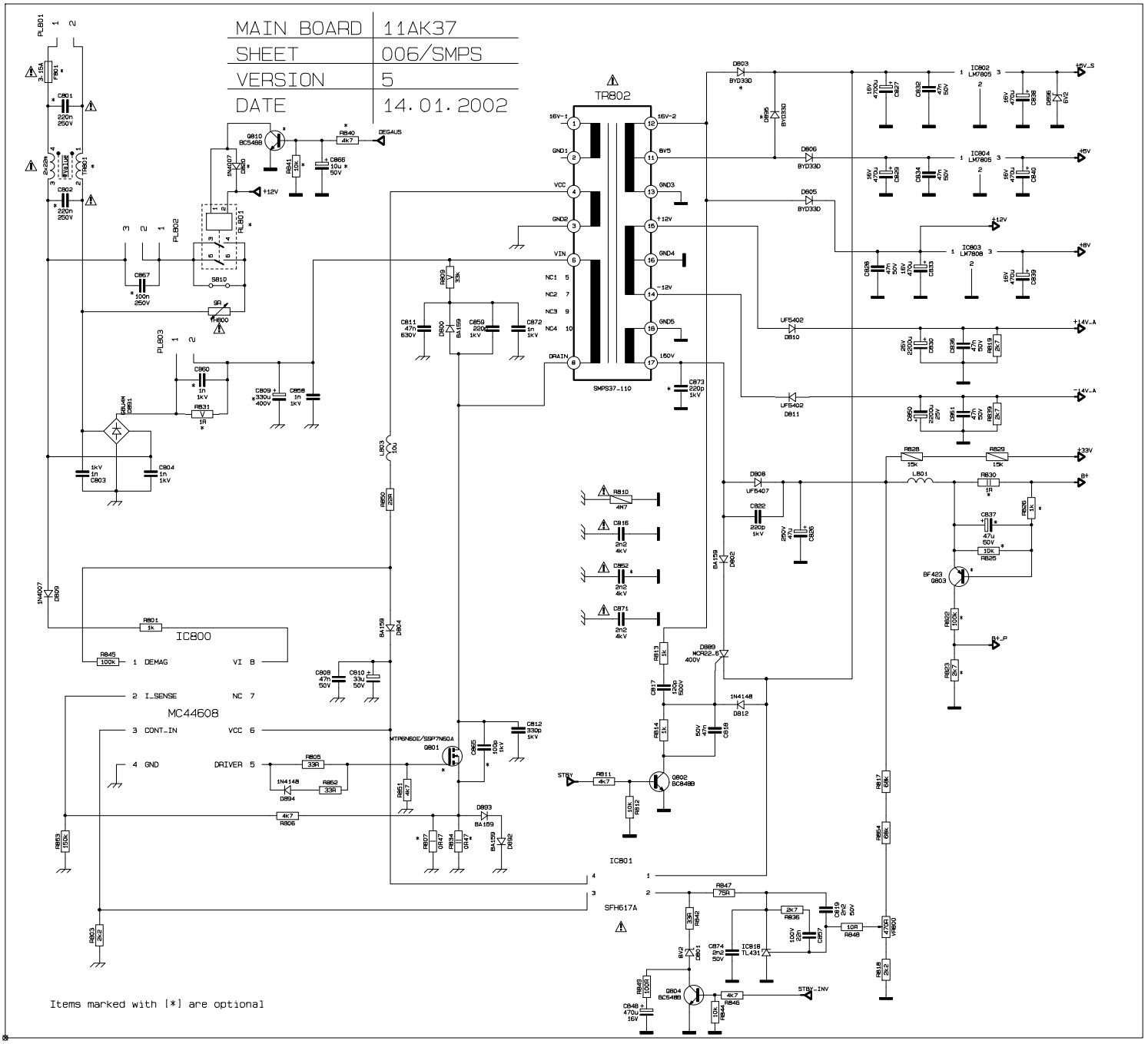


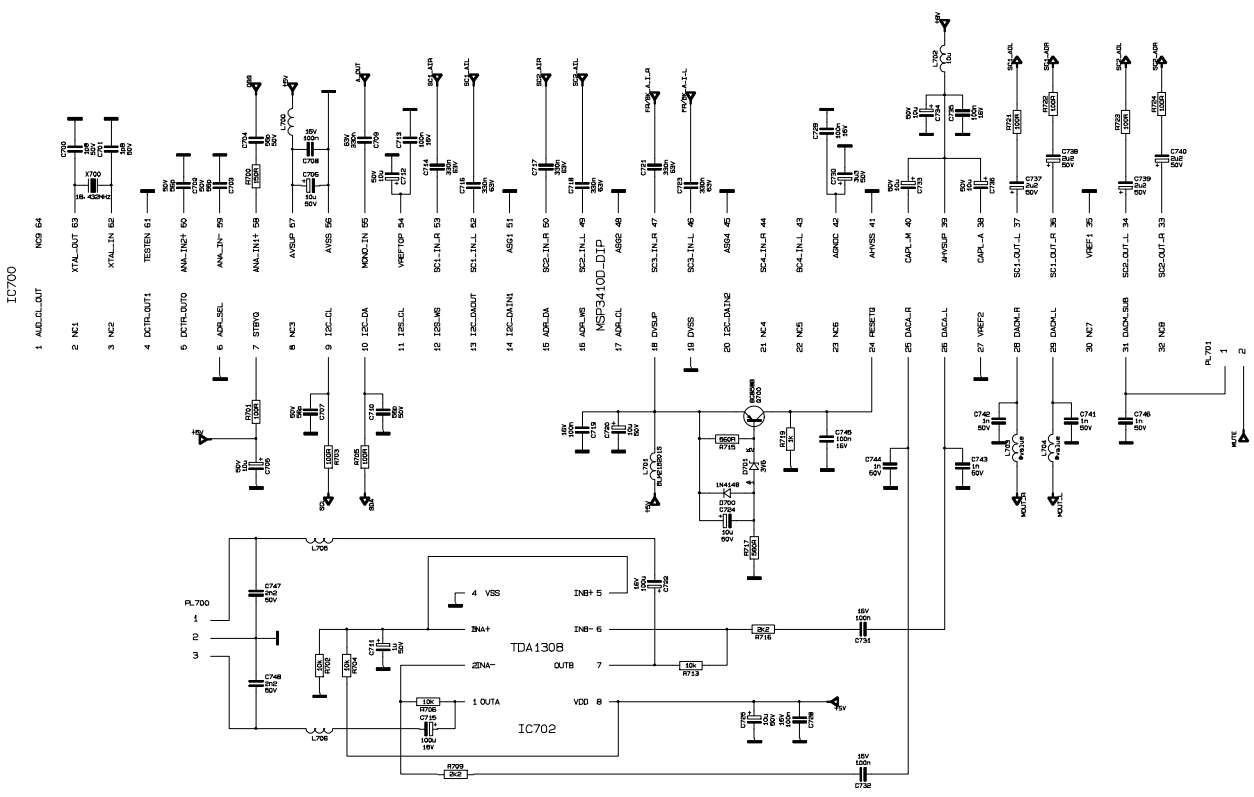
11AK37-6

MAIN BOARD	11AK37
SHEET	003/Video
VERSION	5
DATE	24.01.2002




IC500
ST24C08
WP 1
A1 2
A2 3
VSS 4
VDD 8
PTC 7
SCL 6
SDA 5
IC501
ST92195
TU201
38.9MHz_TVTUN
PL509
SERVICE PIN
PL510
PL511
PL503
PL504
MAIN_BOARD 11AK37
SHEET 001 / uC
VERSION 5
DATE 14.01.2002

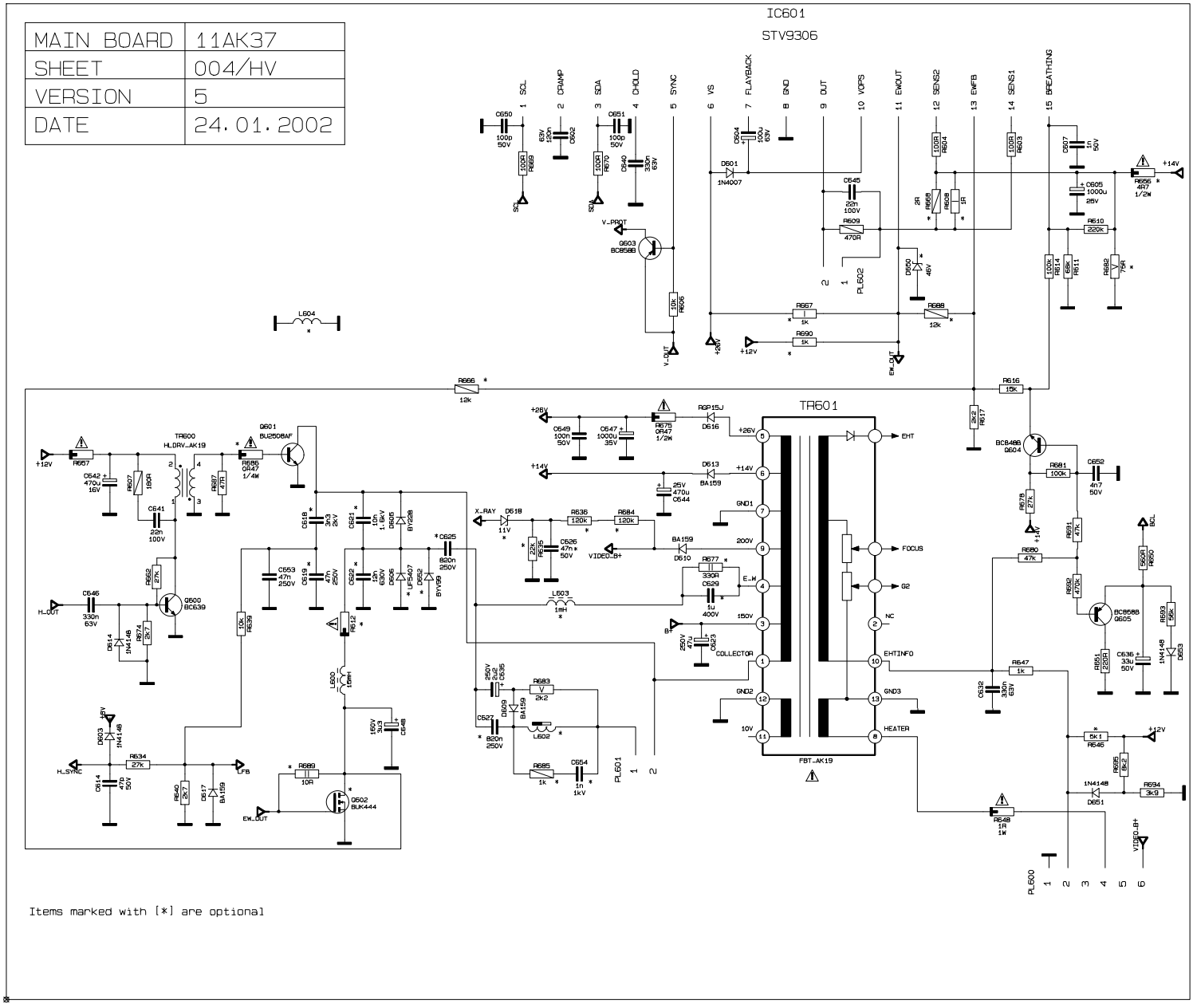

MAIN BOARD 11AK37
SHEET 006/SMPS
VERSION 5
DATE 14.01.2002
TR802
SMPS37_110
IC800
MC44608
IC801
SFH617A
Items marked with [*] are optional



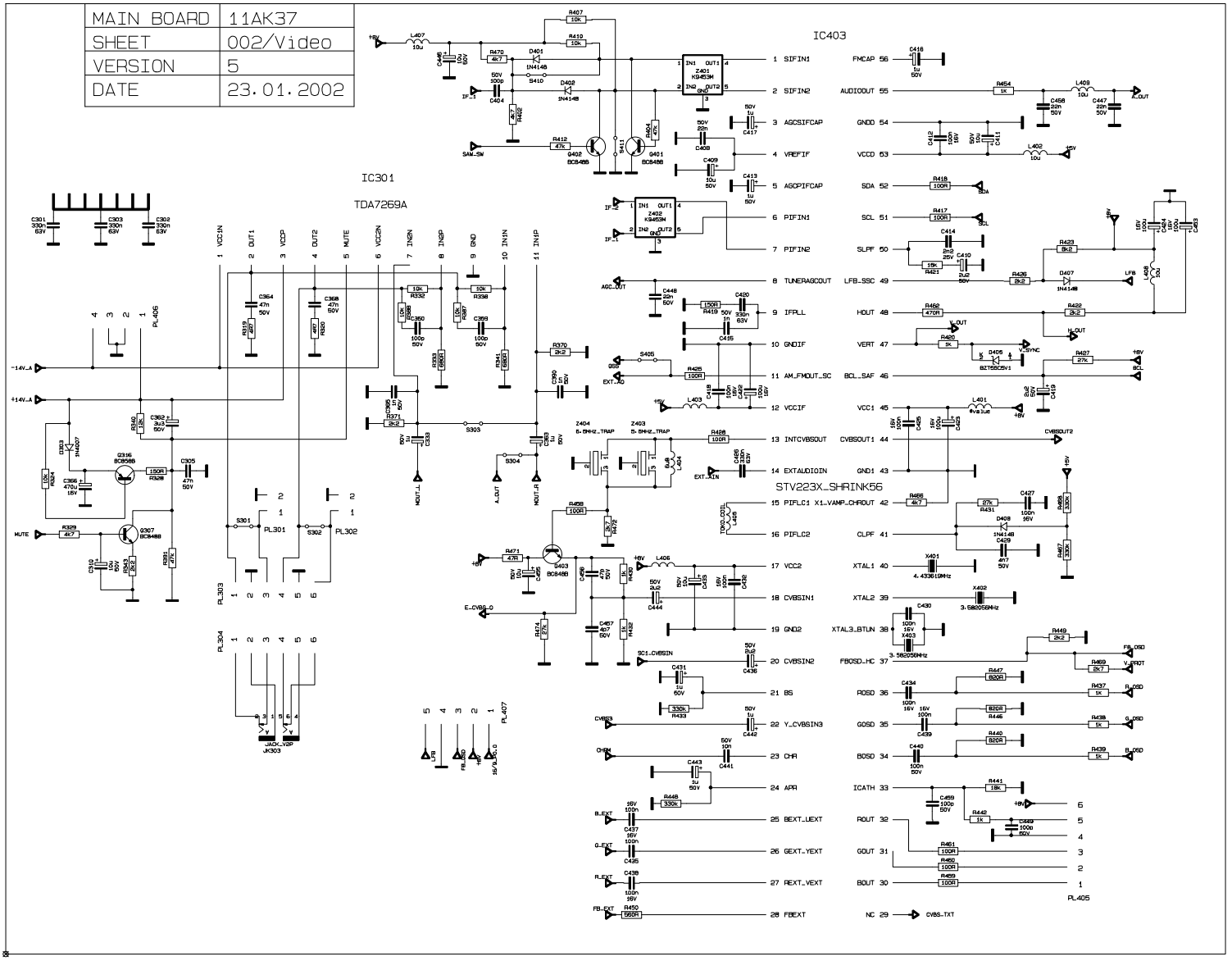
MAIN BOARD	11AK37
SHEET	007/Stereo
VERSION	5
DATE	14.01.2002

MAIN BOARD	11AK30
SHEET	004 / DEFL.
VERSION	D
DATE	06. 11. 2000

MAIN BOARD	11AK37
SHEET	004/HV
VERSION	5
DATE	24. 01. 2002

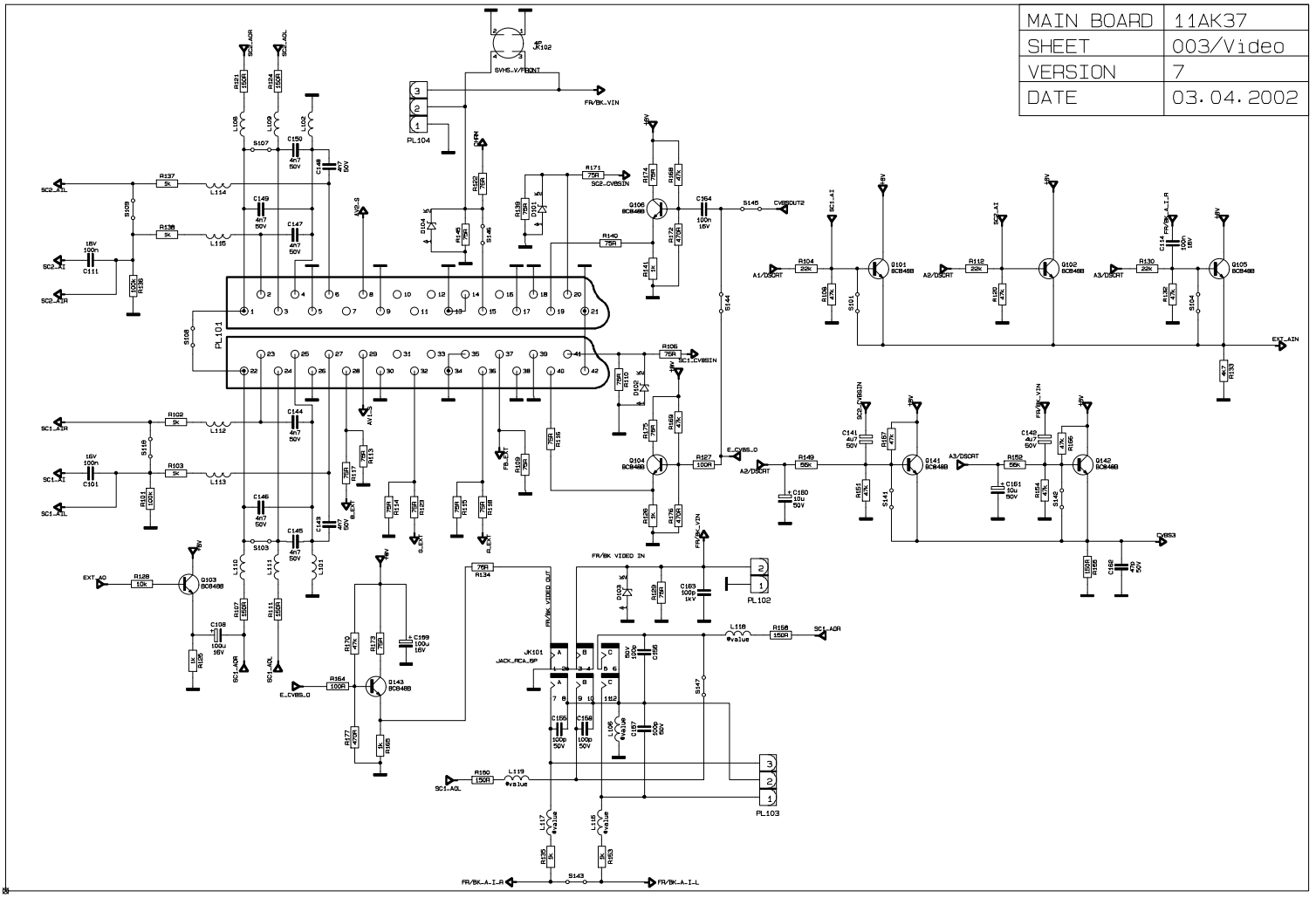


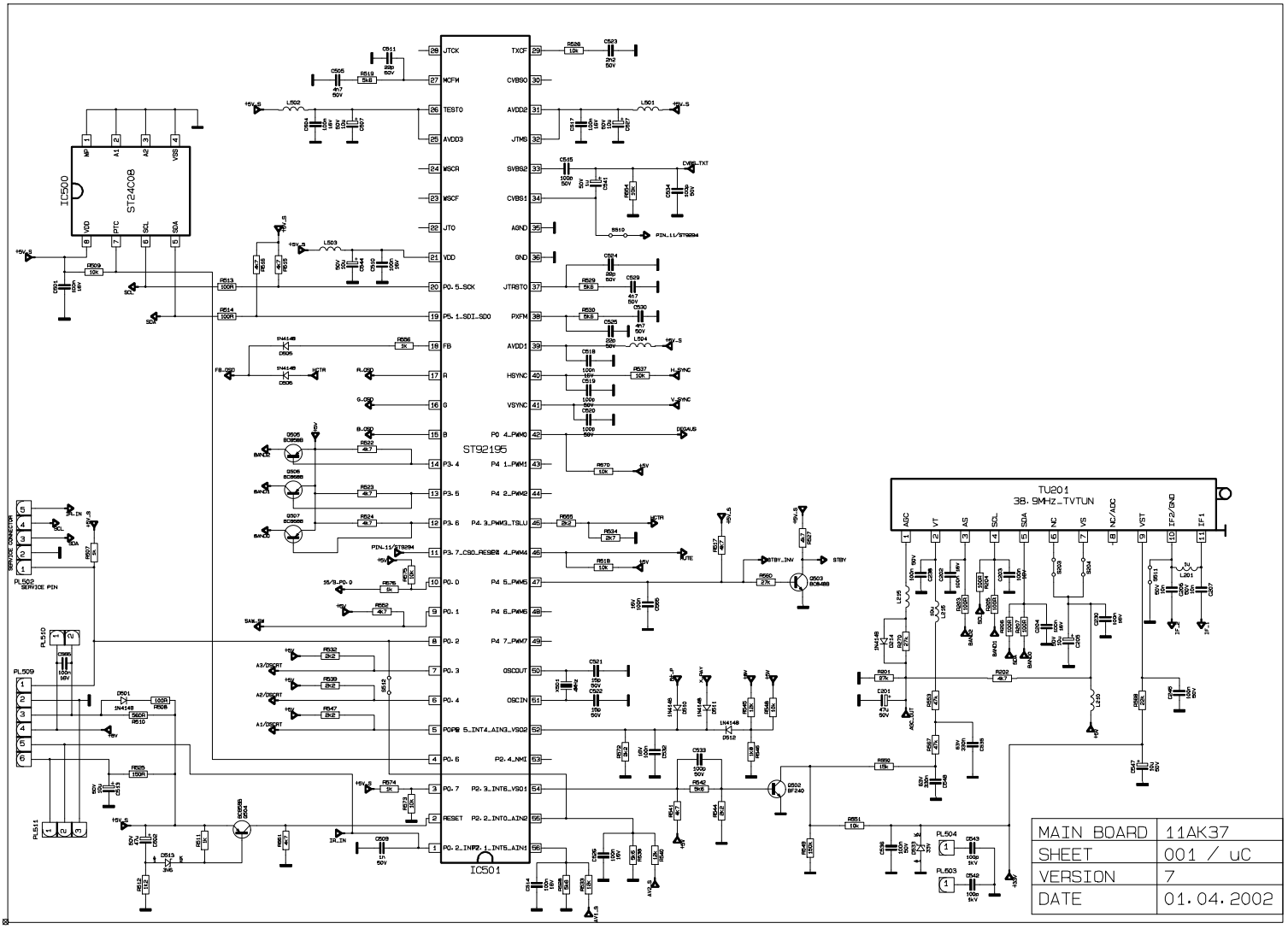
MAIN BOARD	11AK37
SHEET	002/Video
VERSION	5
DATE	23.01.2002



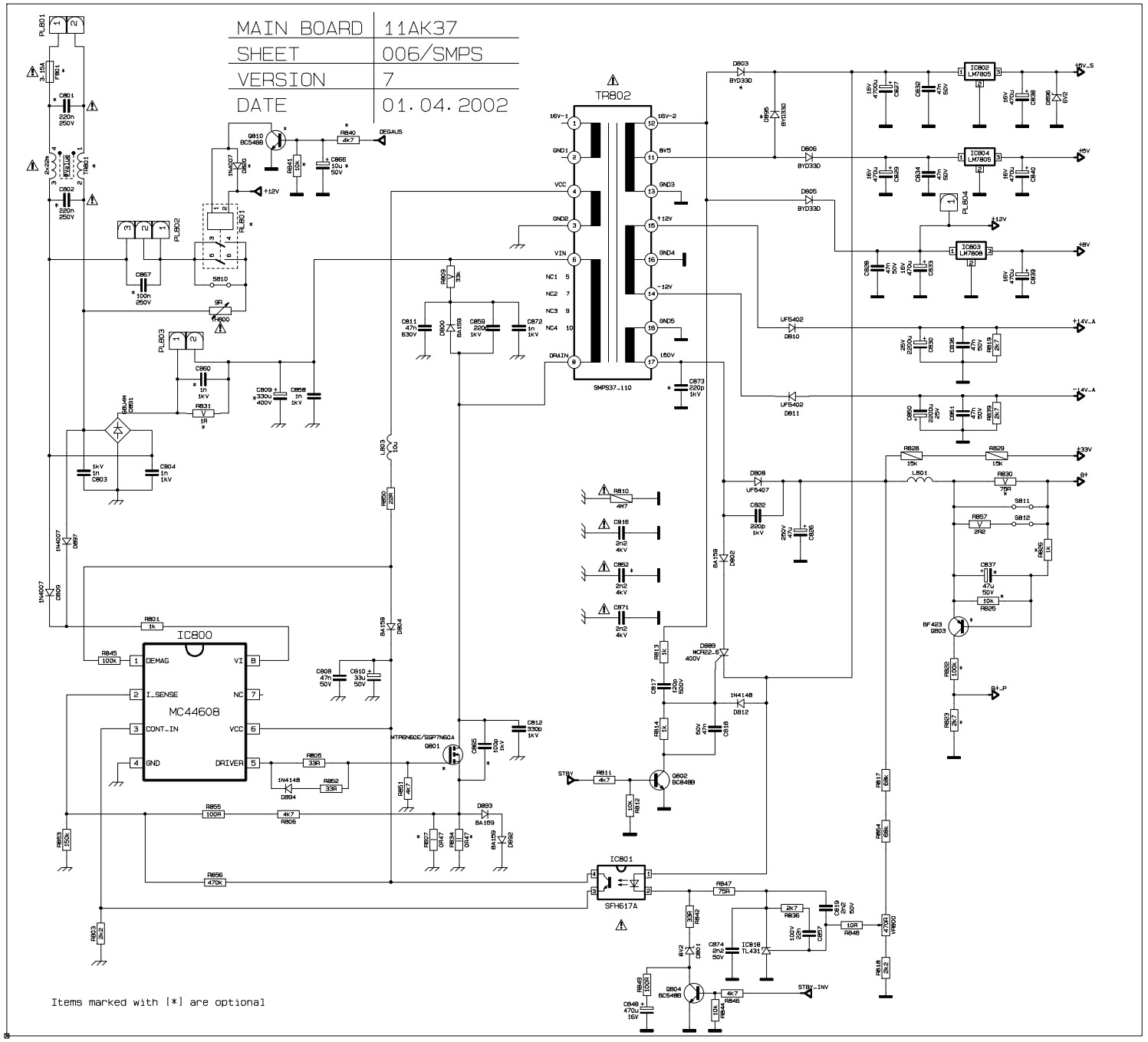
11AK37-7

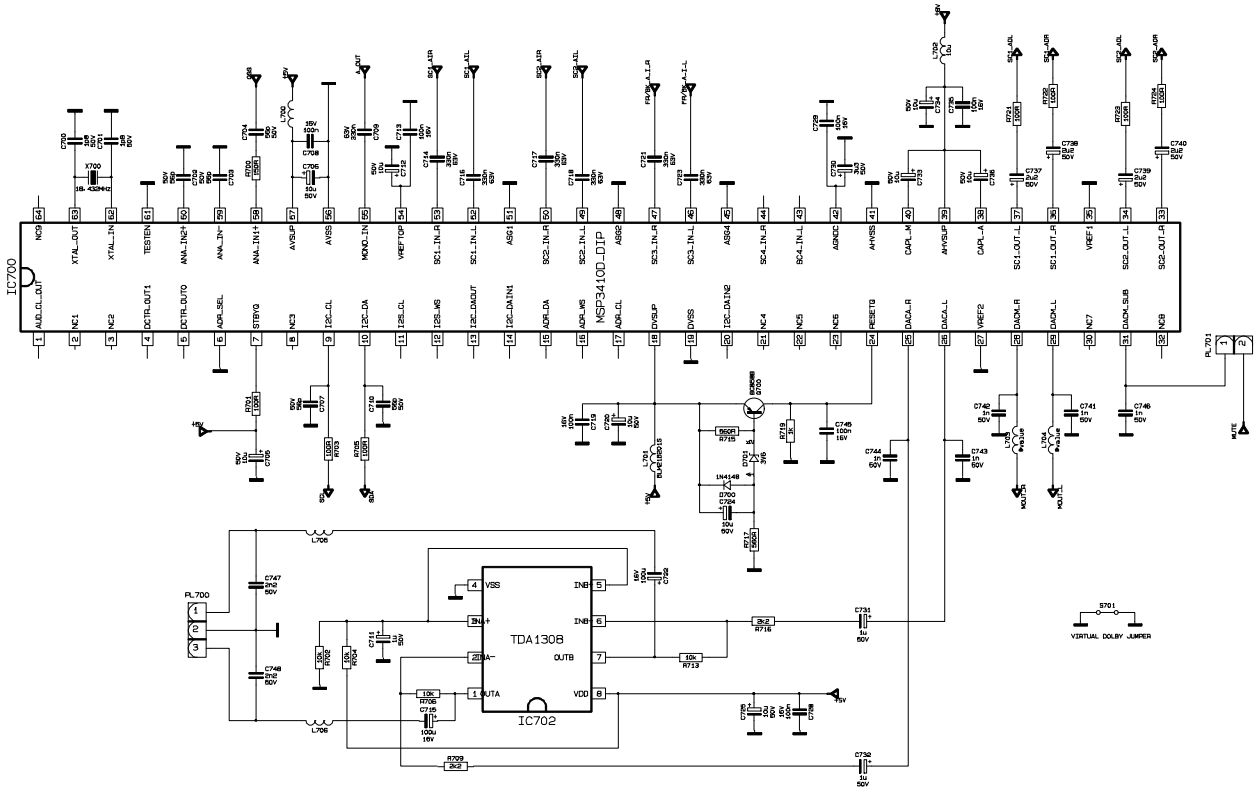
MAIN BOARD	11AK37
SHEET	003/Video
VERSION	7
DATE	03.04.2002




IC501
ST92195
IC500
ST24C08
TU201
38.9MHz_TVTUN
PL500
SERVICE PIN
MAIN_BOARD 11AK37
SHEET 001 / uC
VERSION 7
DATE 01.04.2002

MAIN BOARD	11AK37
SHEET	006/SMPS
VERSION	7
DATE	01.04.2002

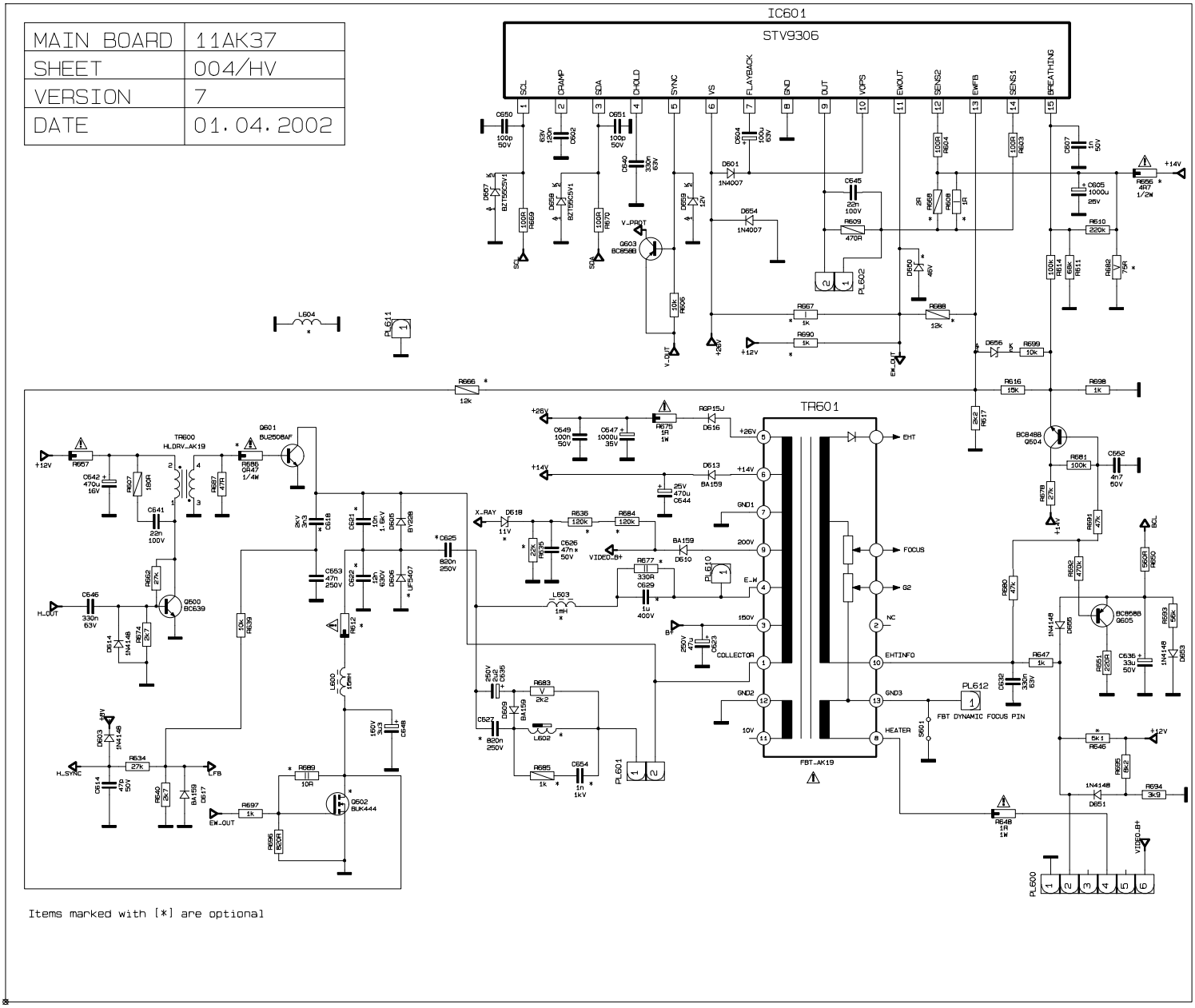




MAIN BOARD	11AK37
SHEET	007/Stereo
VERSION	7
DATE	01.04.2002

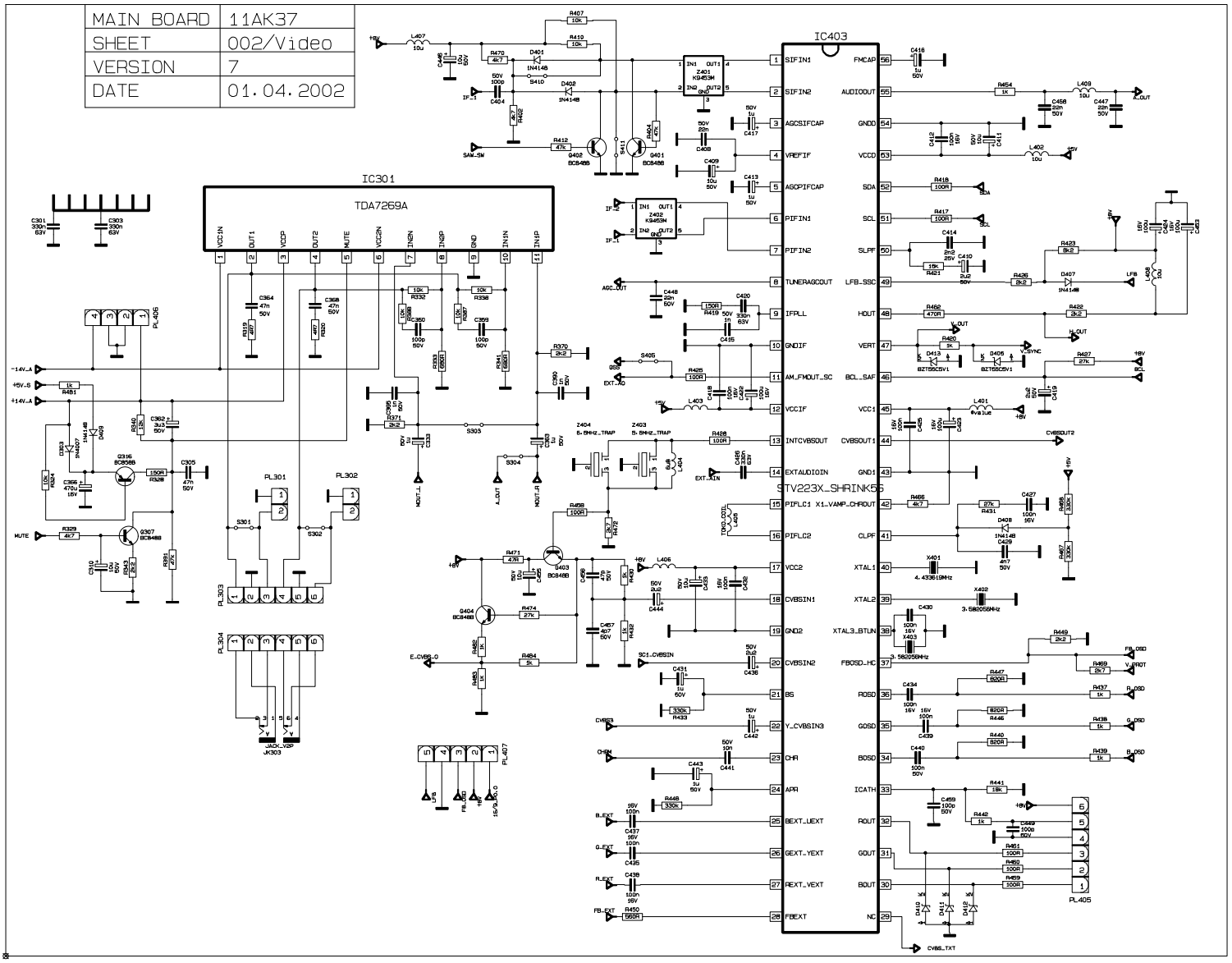
MAIN BOARD	11AK30
SHEET	004 / DEFL.
VERSION	D
DATE	06. 11. 2000

MAIN BOARD	11AK37
SHEET	004/HV
VERSION	7
DATE	01. 04. 2002



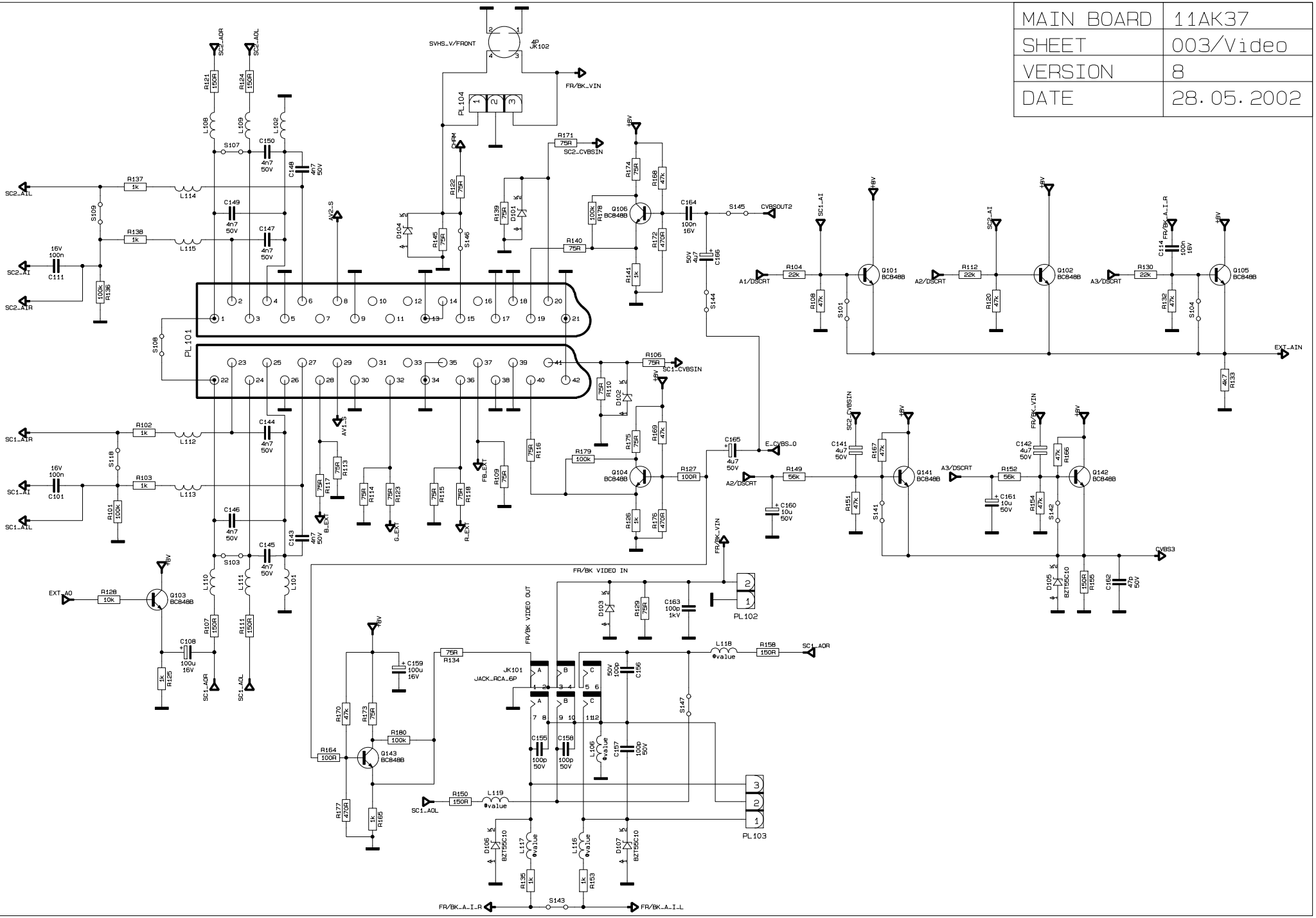
Items marked with [*] are optional

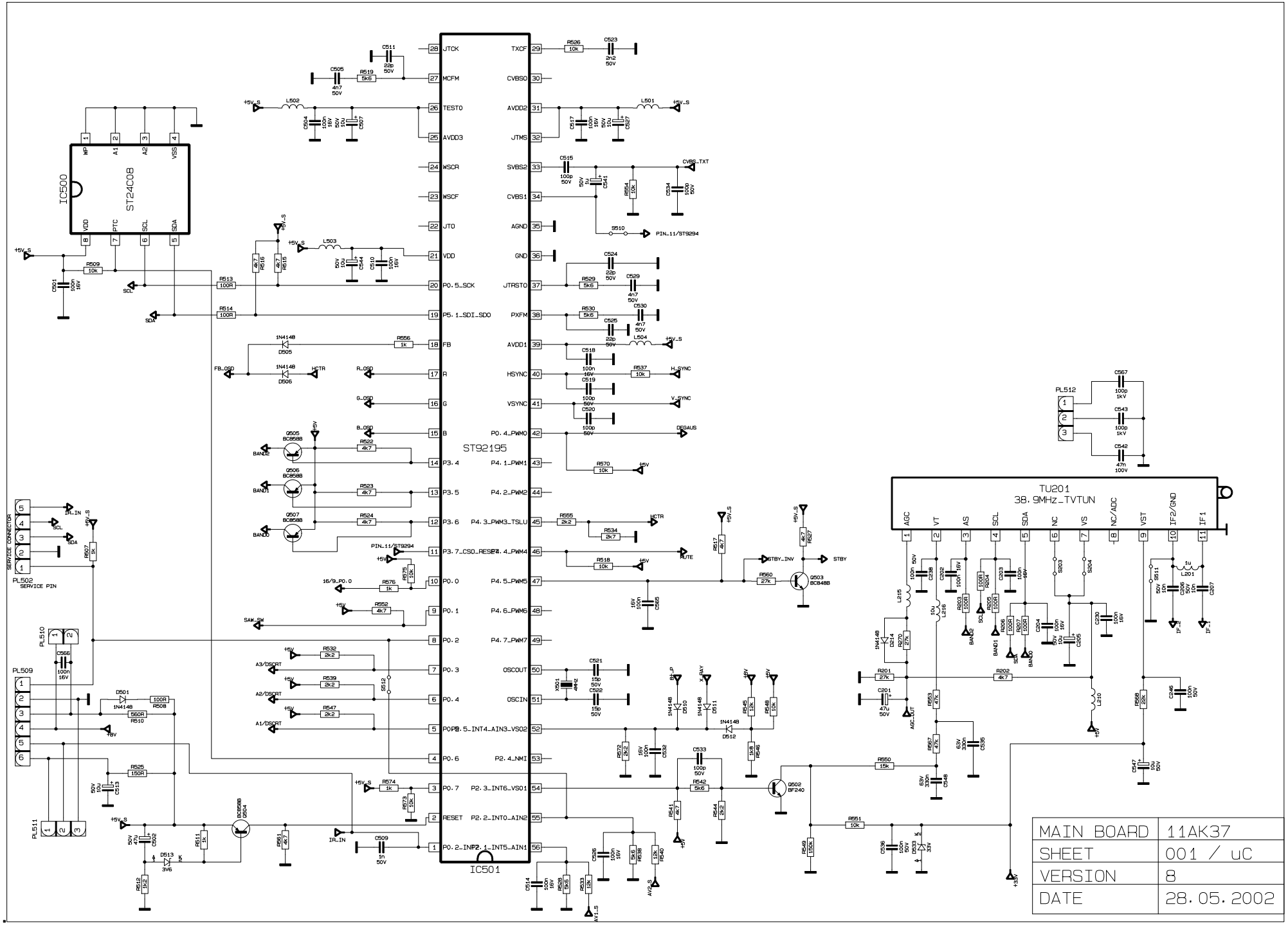
MAIN BOARD	11AK37
SHEET	002/Video
VERSION	7
DATE	01.04.2002



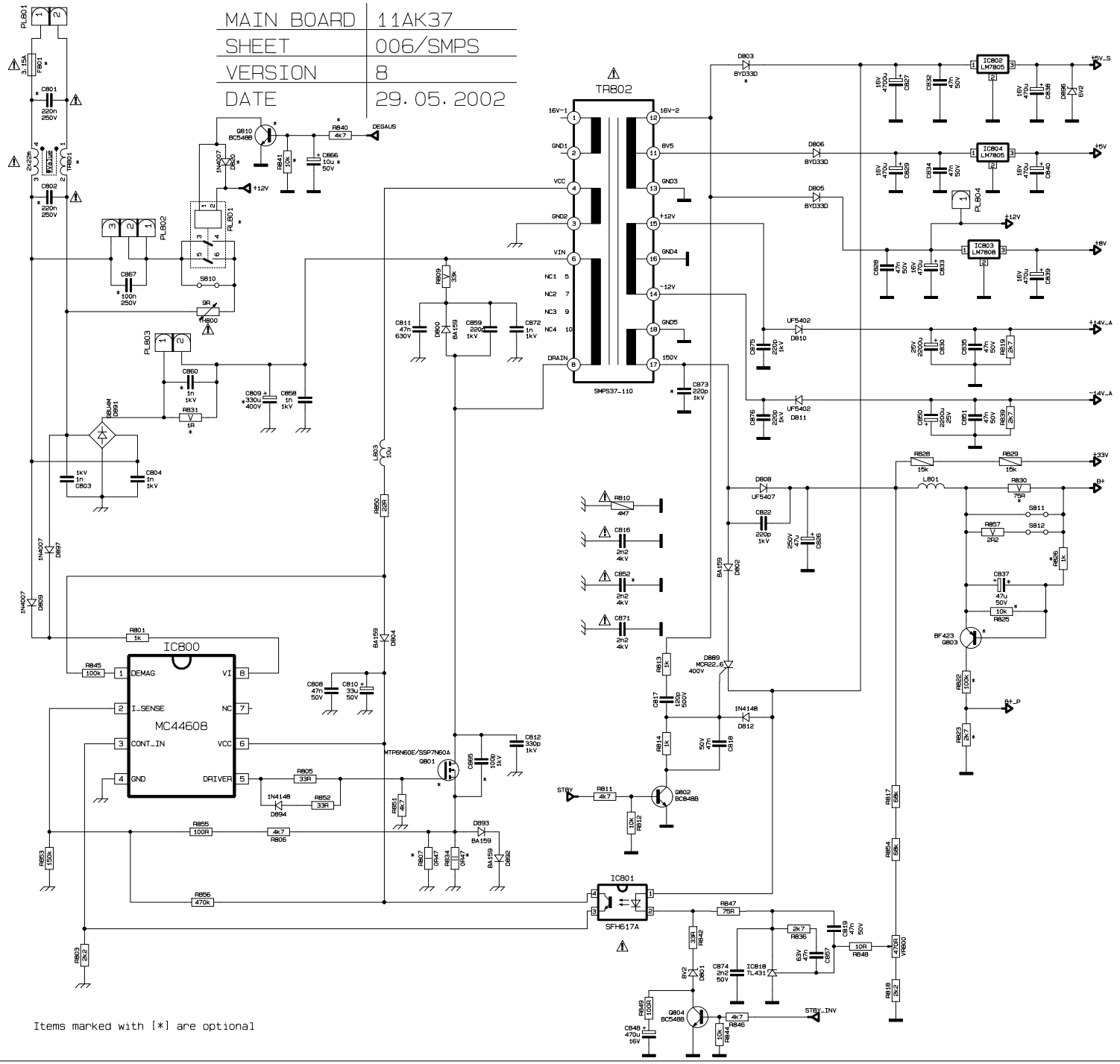
11AK37-8

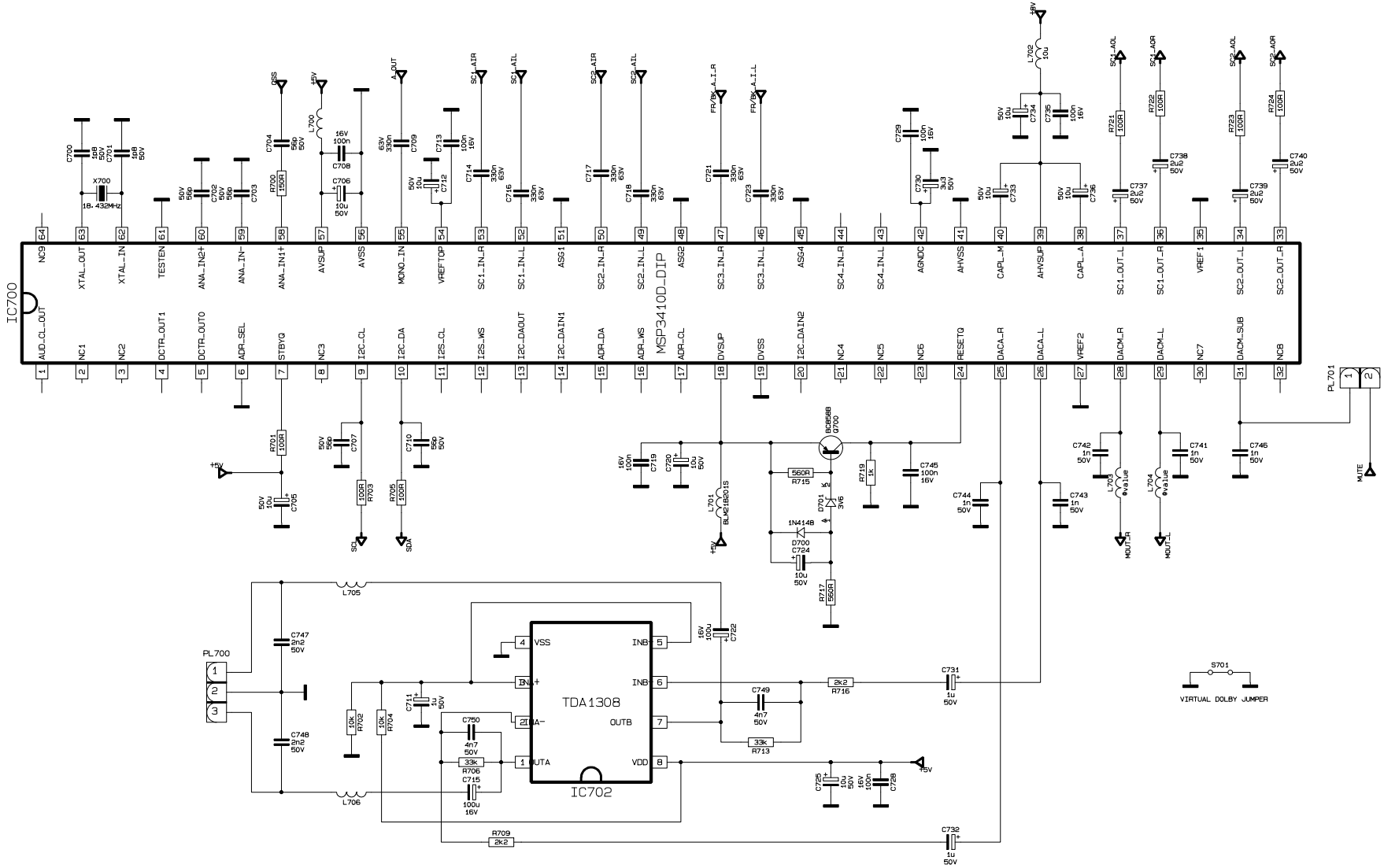
MAIN BOARD	11AK37
SHEET	003/Video
VERSION	8
DATE	28.05.2002




IC501
ST92195
IC500
ST24C08
TU201
38.9MHz_TVTUN
PL502
SERVICE PIN
SERVICE CONNECTOR
PL509
PL510
PL511
PL512
Q502 BF240
Q503 BC848B
Q505 BC858B
Q506 BC858B
Q507 BC858B
D504 BC858B
S510
S512
X501 4MHz
JTCK
MCFM
TEST0
AVDD3
WSCR
WSCF
JTO
VDD
P0.5_SCK
P5.1_SDI_SDO
FB
R
G
B
P3.4
P3.5
P3.6
P3.7_CSO_RESET
P0.0
P0.1
P0.2
P0.3
P0.4
P0.7
RESET
P0.6_INT
TXCF
CVBSO
AVDD2
JTMS
SVBS2
CVBS1
AGND
GND
JTRSTO
PXFM
AVDD1
HSYNC
VSYNC
P0.4_PWM0
P4.1_PWM1
P4.2_PWM2
P4.3_PWM3_TSLU
P4.4_PWM4
P4.5_PWM5
P4.6_PWM6
P4.7_PWM7
OSCOUT
OSCIN
P2.5_INT4_AIN3_VSO2
P2.4_NMI
P2.3_INT6_VSO1
P2.2_INT0_AIN2
P2.1_INT5_AIN1
AGC
VT
AS
SCL
SDA
NC
VS
NC/ADC
VST
IF2/GND
IF1
CVBS_TXT
PIN_11/ST9294
DEGAUS
H_SYNC
V_SYNC
STBY
STBY_INV
MUTE
IR_IN
SAW_SW
BAND0
BAND1
BAND2
A1/DSCRT
A2/DSCRT
A3/DSCRT
16/9_P0.0
MAIN BOARD 11AK37
SHEET 001 / uC
VERSION 8
DATE 28.05.2002

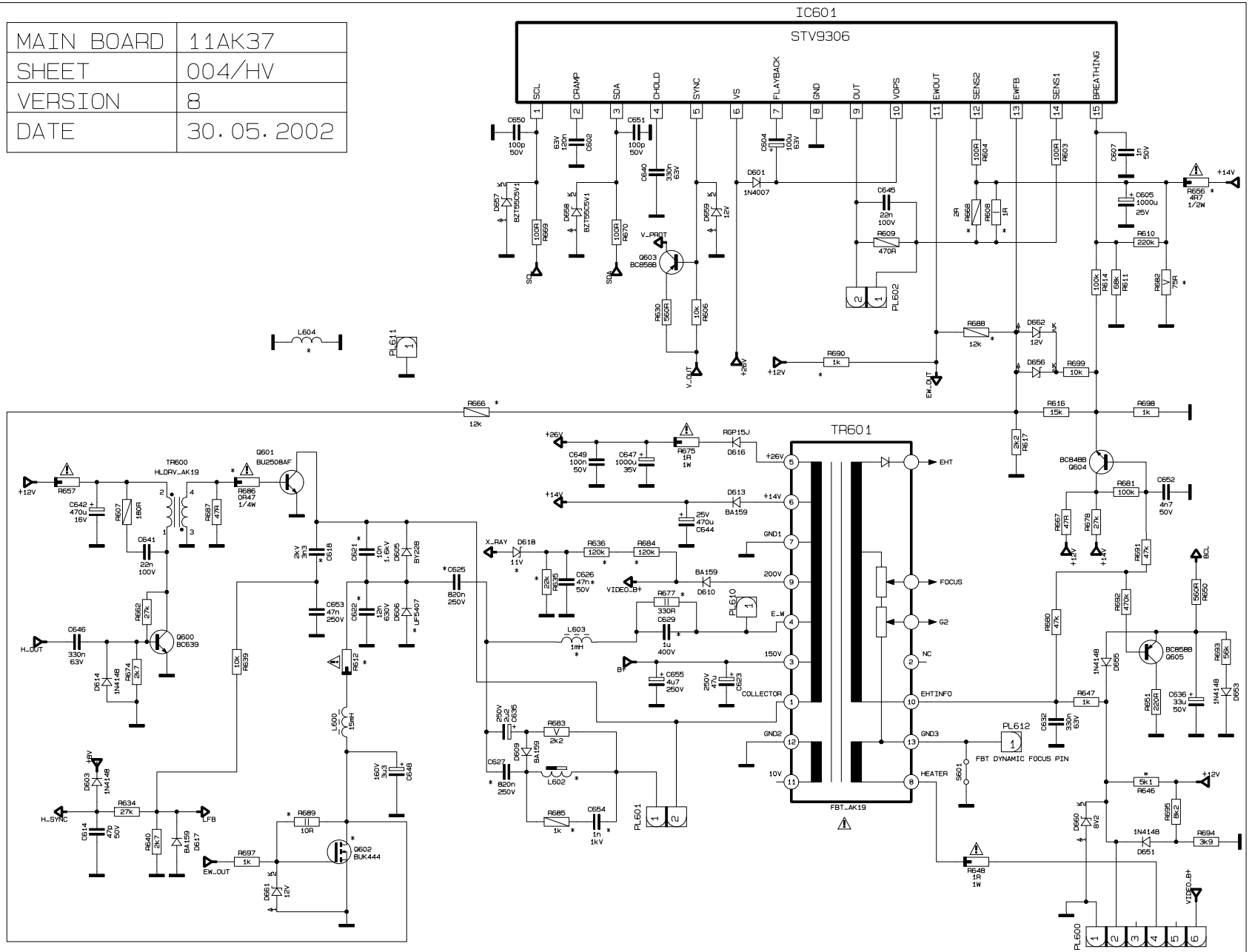
MAIN BOARD	11AK37
SHEET	006/SMPS
VERSION	8
DATE	29. 05. 2002





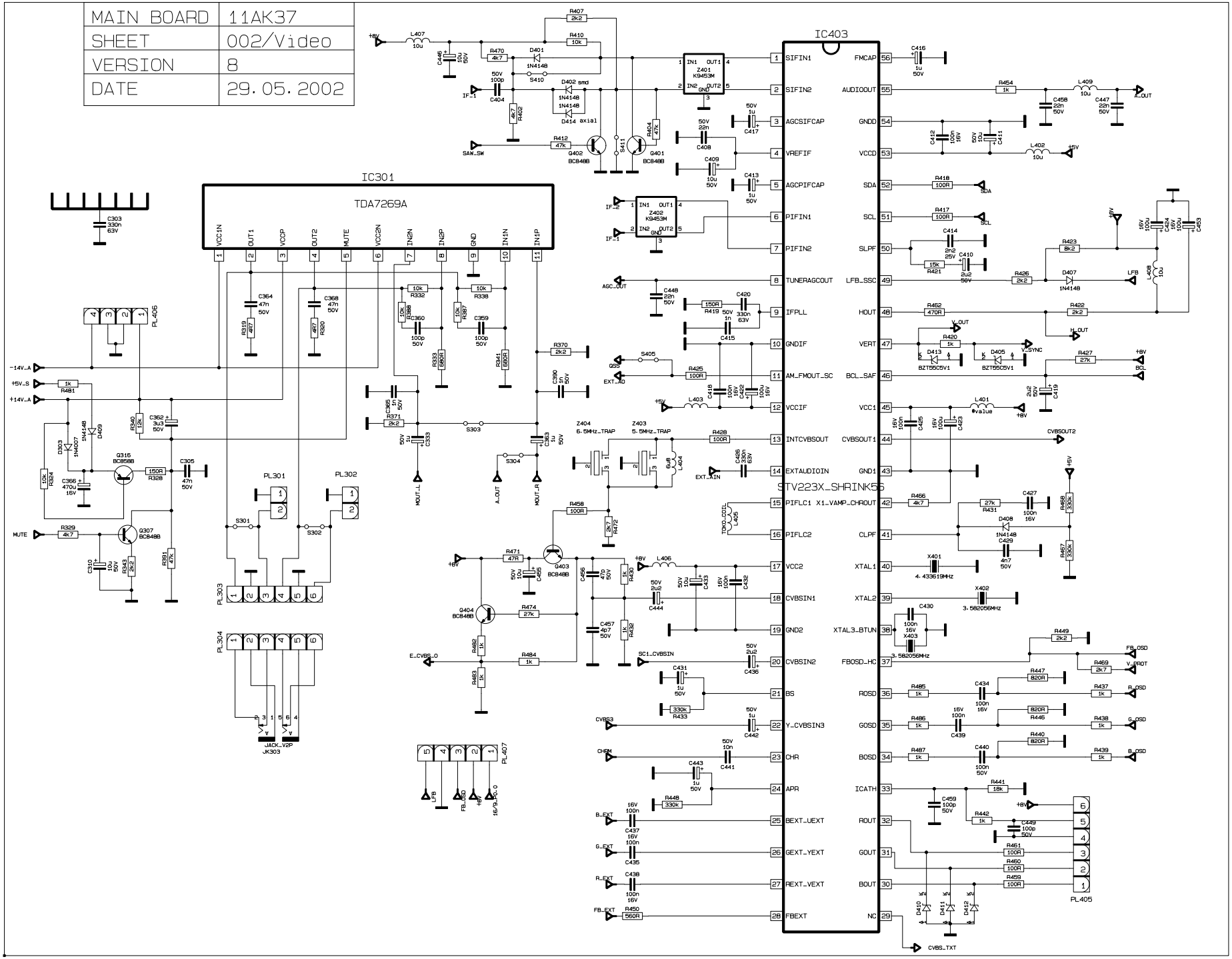
MAIN BOARD	11AK37
SHEET	007/Stereo
VERSION	8
DATE	28.05.2002

MAIN BOARD	11AK37
SHEET	004/HV
VERSION	8
DATE	30.05.2002



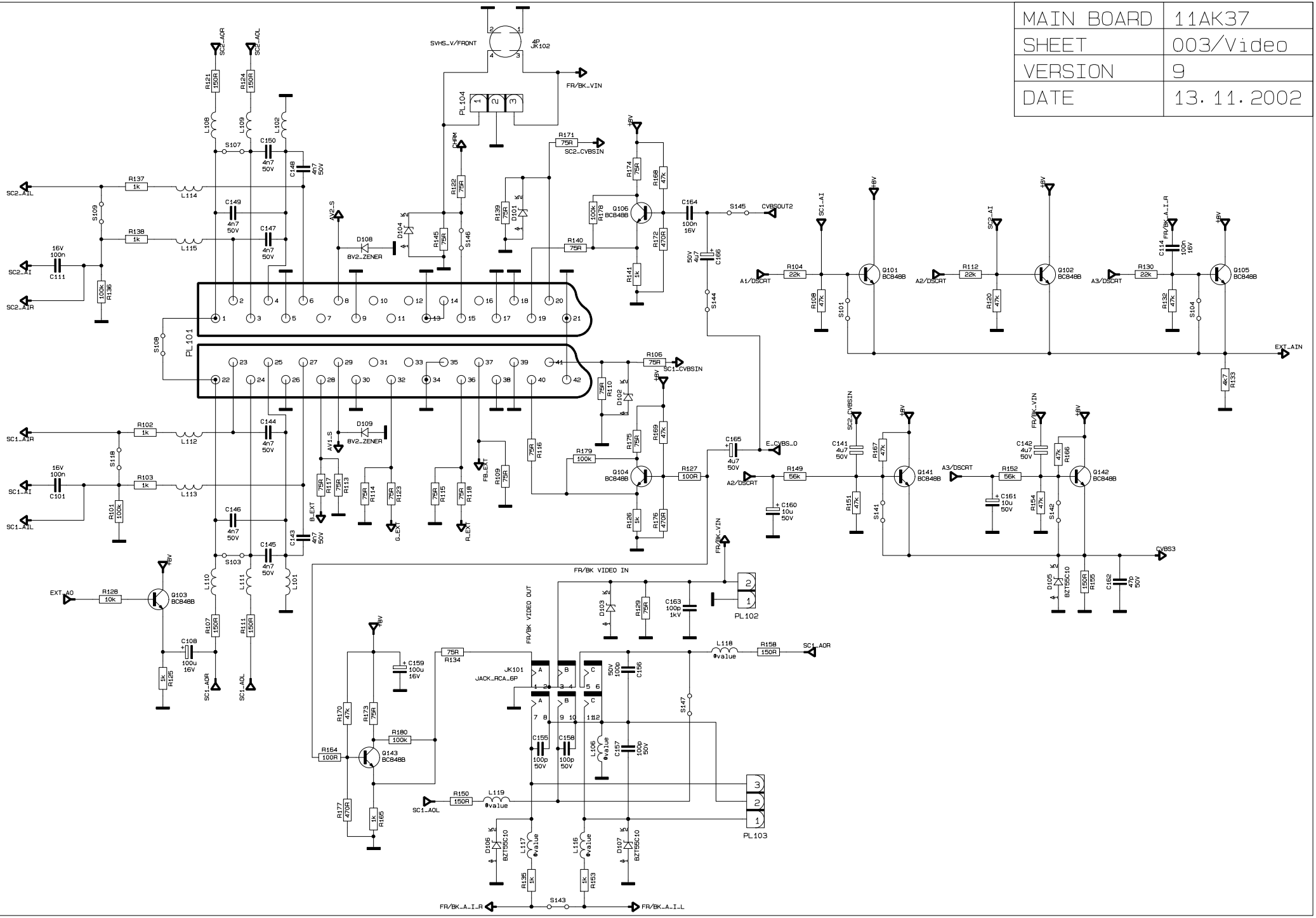
Items marked with [*] are optional

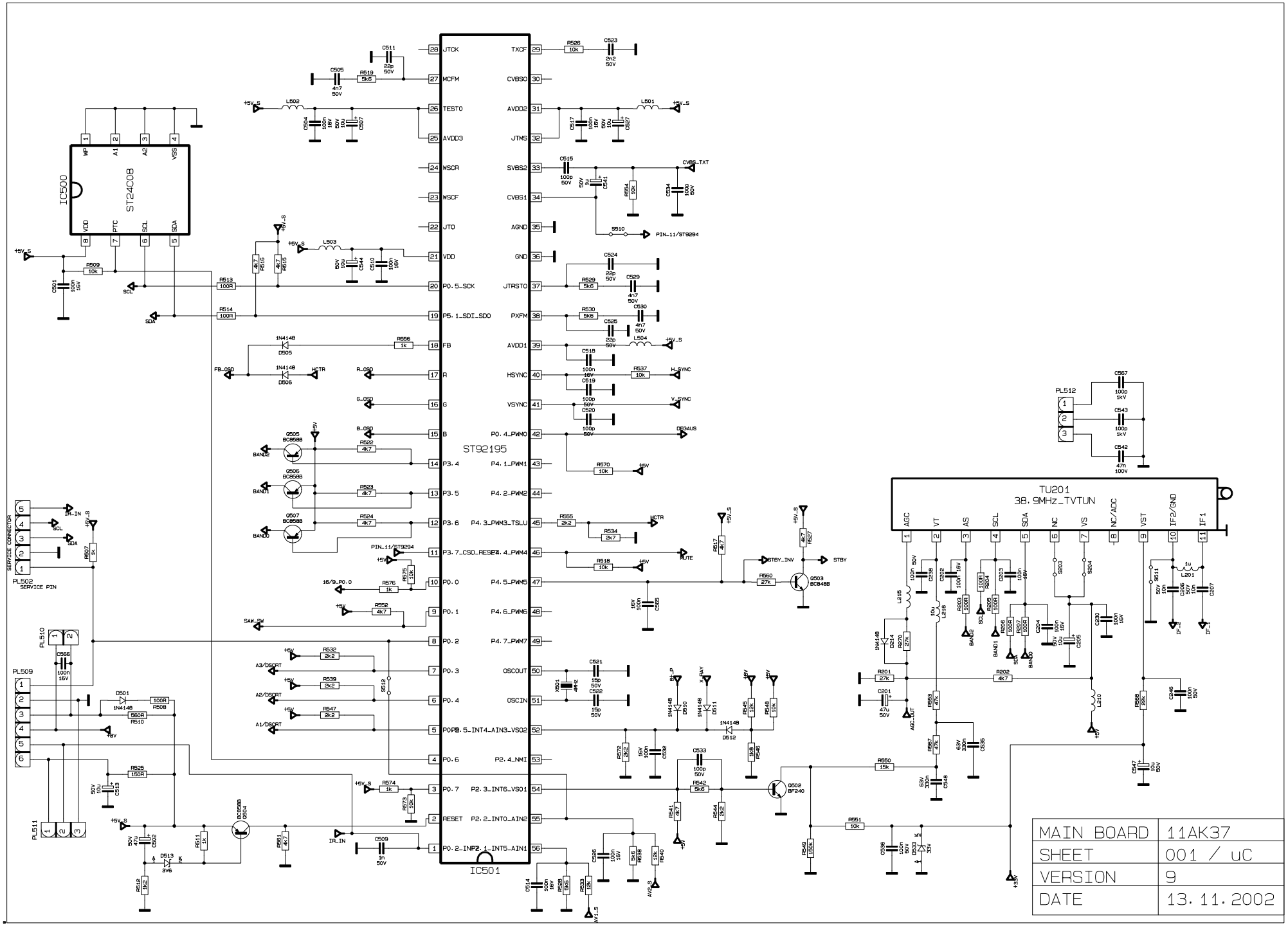
MAIN BOARD	11AK37
SHEET	002/Video
VERSION	8
DATE	29.05.2002



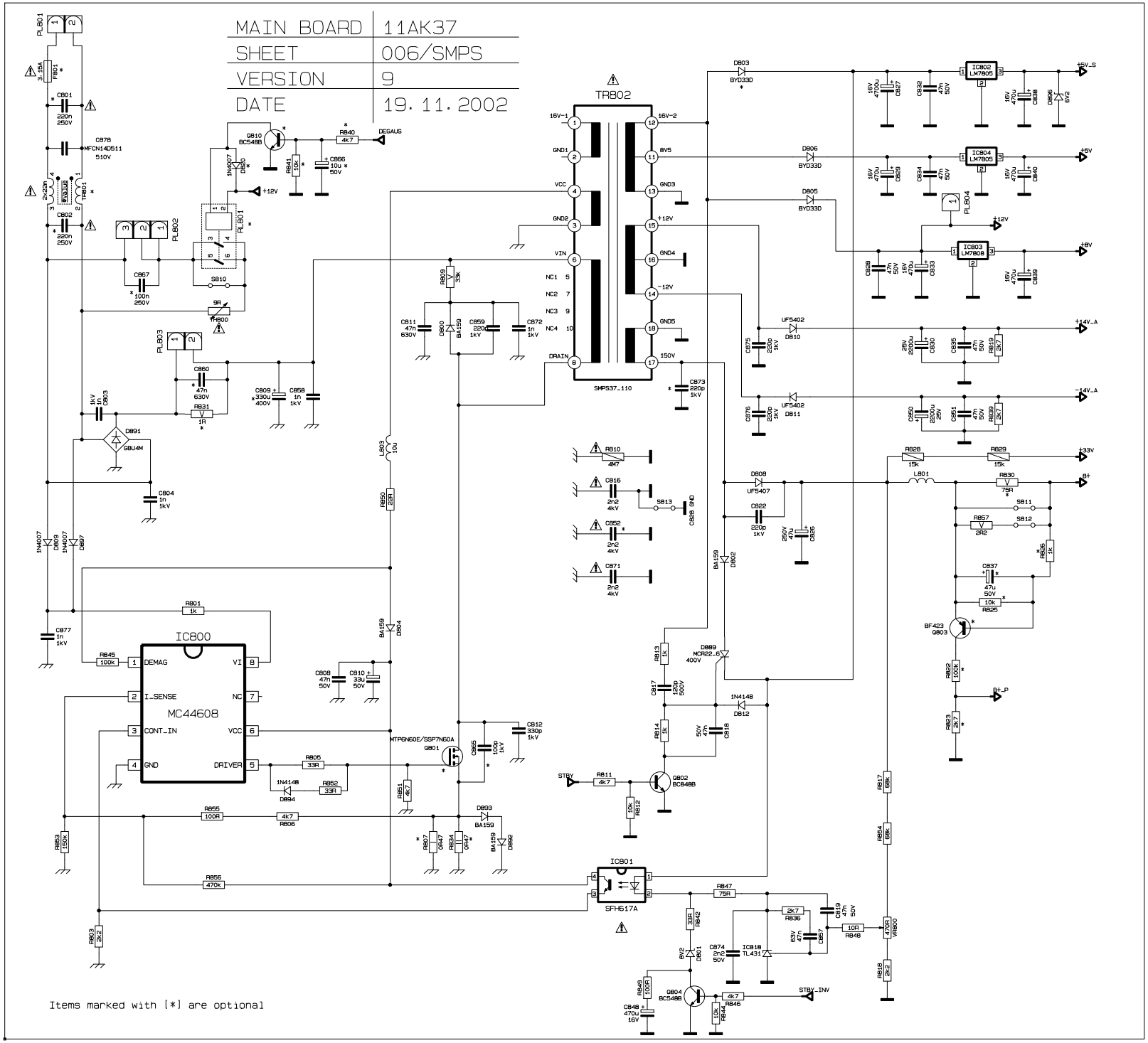
11AK37-9

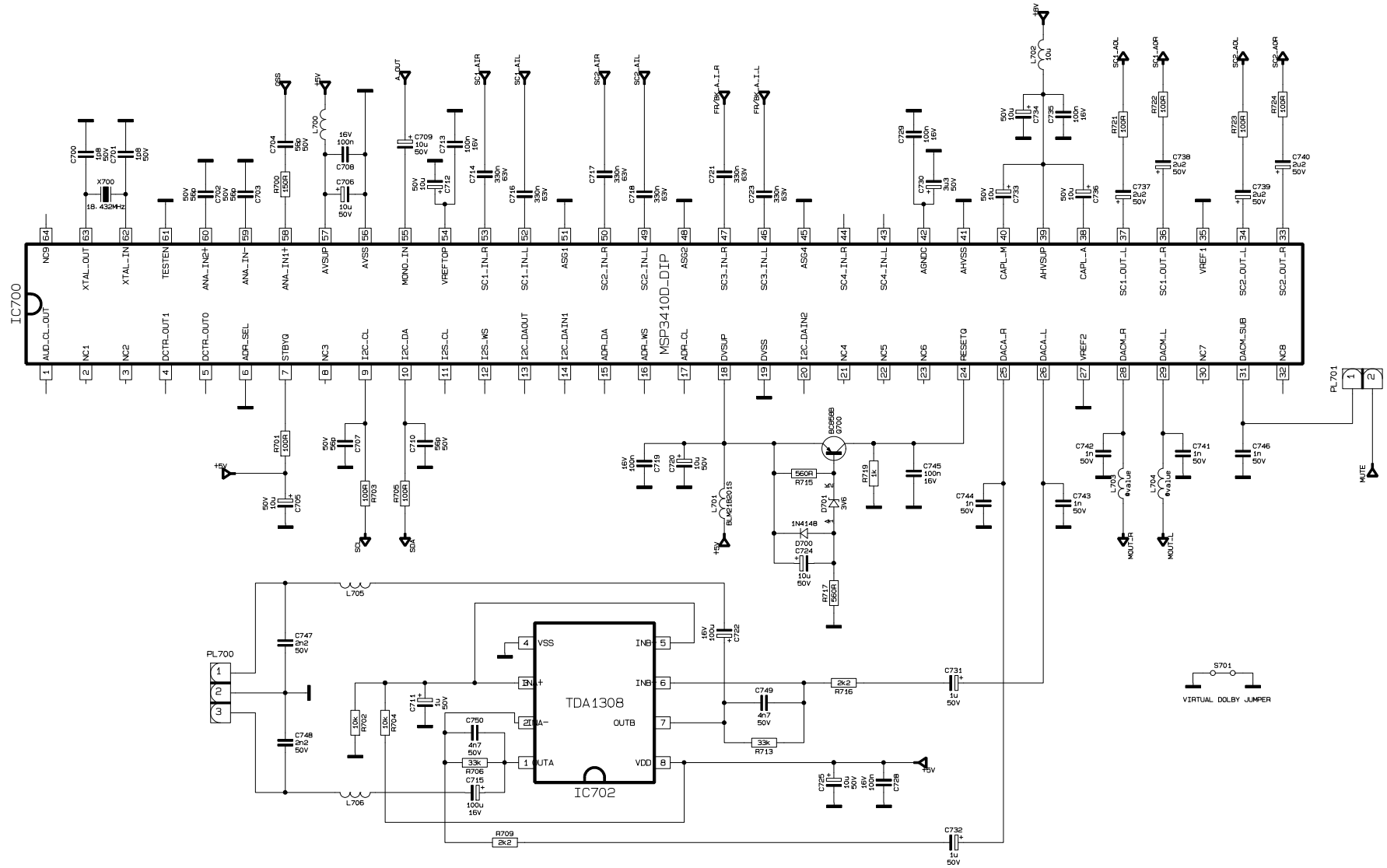
MAIN BOARD	11AK37
SHEET	003/Video
VERSION	9
DATE	13. 11. 2002




IC500
ST24C08
WP
A1
A2
VSS
VDD
PTC
SCL
SDA
IC501
ST92195
JTCK
MCFM
TEST0
AVDD3
WSCR
WSCF
JTO
VDD
P0.5_SCK
P5.1_SDI_SDO
FB
R
G
B
P3.4
P3.5
P3.6
P3.7_CSO_RESET
P0.0
P0.1
P0.2
P0.3
P0.4
P0.5_INT4_AIN3_VSO2
P0.6
P0.7
RESET
P0.2_INT5_AIN1
TXCF
CVBSO
AVDD2
JTMS
SVBS2
CVBS1
AGND
GND
JTRSTO
PXFM
AVDD1
HSYNC
VSYNC
P0.4_PWM0
P4.1_PWM1
P4.2_PWM2
P4.3_PWM3_TSLU
P4.4_PWM4
P4.5_PWM5
P4.6_PWM6
P4.7_PWM7
OSCOUT
OSCIN
P2.4_NMI
P2.3_INT6_VSO1
P2.2_INT0_AIN2
P2.1_INT5_AIN1
TU201
38.9MHz_TVTUN
AGC
VT
AS
SCL
SDA
NC
VS
NC/ADC
VST
IF2/GND
IF1
SERVICE CONNECTOR
SERVICE PIN
PL502
PL509
PL510
PL511
PL512
IR_IN
SCL
SDA
BAND2
BAND1
BAND0
A3/DSCRT
A2/DSCRT
A1/DSCRT
SAW_SW
16/9_P0.0
FB_OSD
R_OSD
G_OSD
B_OSD
HCTR
MUTE
STBY_INV
STBY
H_SYNC
V_SYNC
DEGAUS
PIN_11/ST9294
CVBS_TXT
+5V_S
+8V
+5V
+3V
AVA_S
MAIN BOARD 11AK37
SHEET 001 / uC
VERSION 9
DATE 13.11.2002

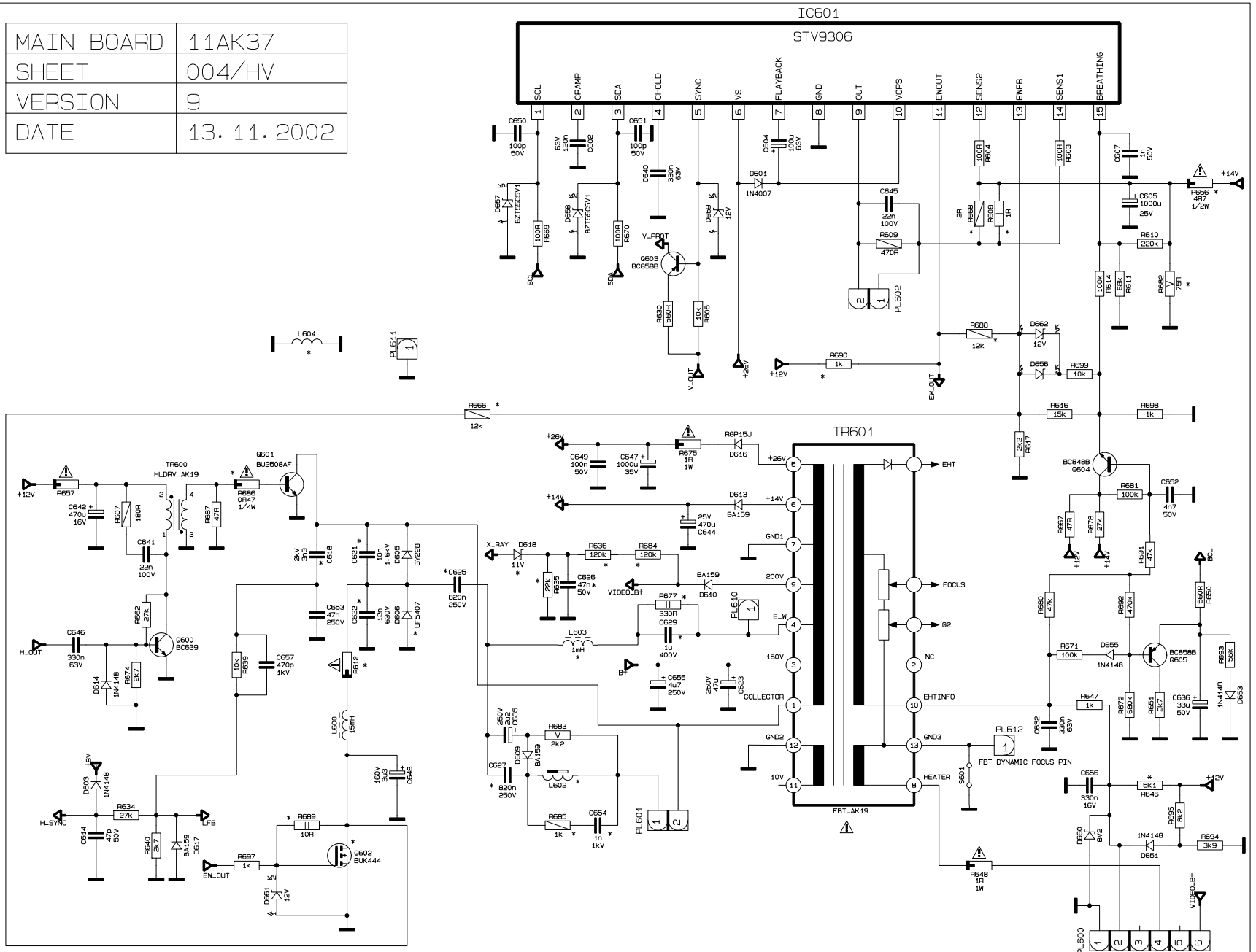
MAIN BOARD	11AK37
SHEET	006/SMPS
VERSION	9
DATE	19. 11. 2002





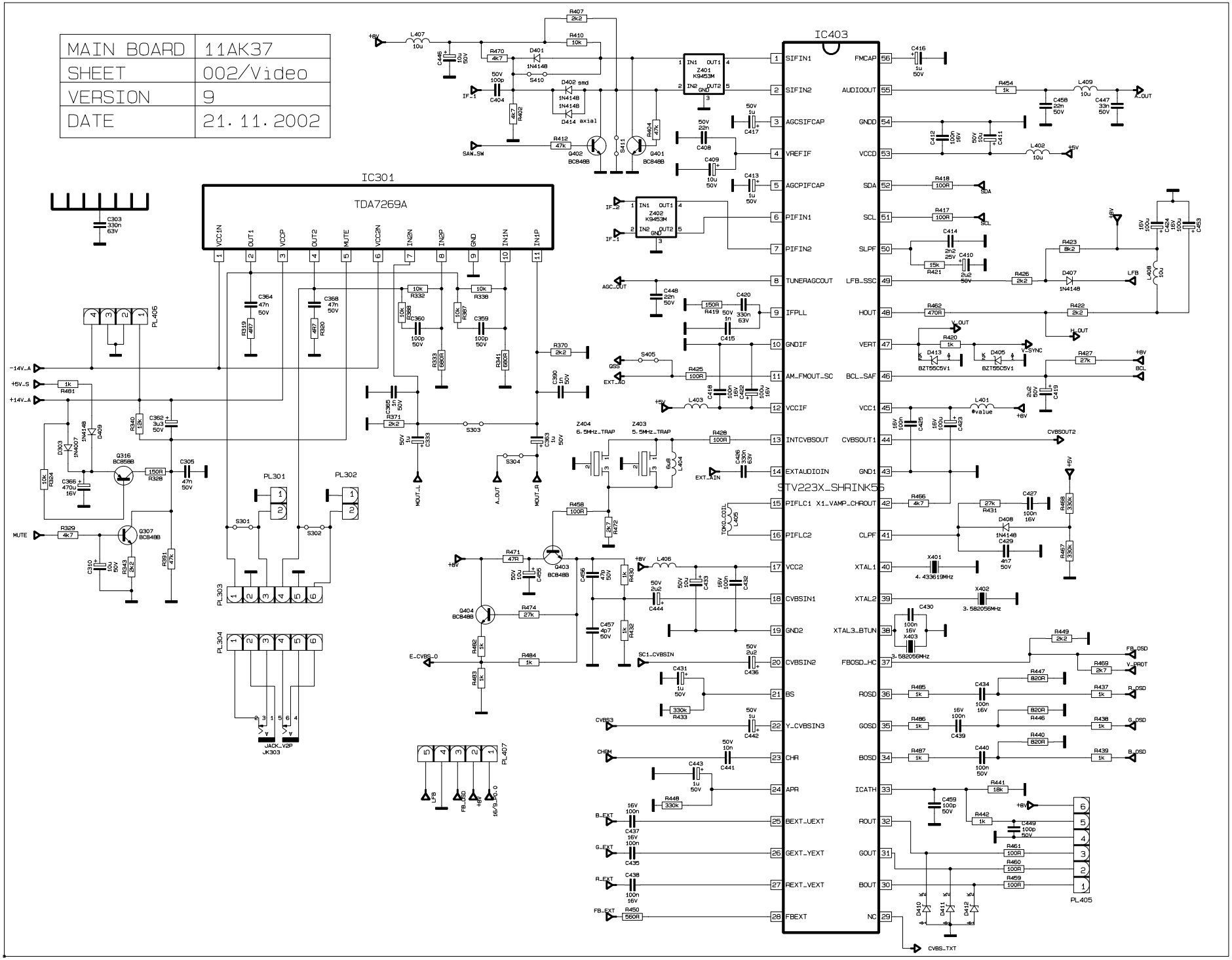
MAIN BOARD	11AK37
SHEET	007/Stereo
VERSION	9
DATE	13. 11. 2002

MAIN BOARD	11AK37
SHEET	004/HV
VERSION	9
DATE	13. 11. 2002



Items marked with [*] are optional

MAIN BOARD	11AK37
SHEET	002/Video
VERSION	9
DATE	21.11.2002



Parts List

BILL OF MATERIAL LIST

10016298 2841 TOSHIBA TOSHIBA 28N33B(AK37)SILVER

NO	PART NUMBER	DESCRIPTION	UNIT	QTY	POSITION NUMBER				
1	V20000542	SPK.A.721X/20/70-1/82X/28(19)ST/MN WO/HP	PC	1,000	.	.	.	.	.
2	V20000546	SPK.ASSY.8R 15W 721X/20(19)(R)	PC	1,000	.	.	.	.	.
3	V30001946	SPEAKER 8R 15W 57*160	PC	1,000	.	.	.	.	.
4	V30012631	CNAS 2P/760 DIS W/BL C+FER UL2547 AWG24	PC	1,000	.	.	.	.	.
5	V20000547	SPK.ASSY.8R 15W 721X/20(19)(L)	PC	1,000	.	.	.	.	.
6	V30001946	SPEAKER 8R 15W 57*160	PC	1,000	.	.	.	.	.
7	V30012632	CNAS 2P/690 DIS W/C+FER UL2547 AWG24	PC	1,000	.	.	.	.	.
8	V20095322	PASIF PFC 37-TRF0,9A (25-28-29-28"16/9)	PC	1,000	.	.	.	.	.
9	V30015614	TRF PFC 0,9A 42 MH EP	PC	1,000	.	.	.	.	.
10	V30018087	CNAS 2P/350 TRFPFC DIS W/C UL1672AWG22	PC	1,000	.	.	.	.	.
11	V35000217	SCREW S C SYF YFMB 3.5*9.5	PC	2,000	.	.	.	.	.
12	V20095506	BASE 2840-41-42 (I)28"(4:3) WO/TESLA TÜP	PC	1,000	.	.	.	.	.
13	V60000008	HIPS (NATURAL)	KG	0,838	.	.	.	.	.
14	V60000022	MASTERBATCH (BLACK)	KG	0,004	.	.	.	.	.
15	V20097393	SNOW BOX ASSY 284X 4:3	PC	1,000	.	.	.	.	.
16	V20095507	SNOW BOX TOP 284X	PC	1,000	.	.	.	.	.
17	V60000011	EPS	KG	0,549	.	.	.	.	.
18	V20095508	SNOW BOX BOTTOM 284X	PC	1,000	.	.	.	.	.
19	V60000011	EPS	KG	0,549	.	.	.	.	.
20	V20098775	ON/OFF SW AS.AK37(28-29")BSI (W/MAKARON)	PC	1,000	.	.	.	.	.
21	V30002174	SWITCH ON/OFF 4A/64A	PC	1,000	.	.	.	.	.
22	V30002368	CNAS 2P/650 AC MAINS W/C	PC	1,000	.	.	.	.	.
23	V30002382	POWER CORD 2.2MT FILTER+FUSE	PC	1,000	.	.	.	.	.
24	V40000127	SWITCH INSULATION DOOR LK101	PC	1,000	.	.	.	.	.
25	V40001898	MACARON (12cm.lsý ile daralan)	PC	1,000	.	.	.	.	.
26	V20102528	MD.ASY.TK127-XX41-41W 5SW WO/DVD AK37-41	PC	1,000	.	.	.	.	.
28	V30002181	SWITCH TACT	PC	5,000	SW1	SW2	SW3	SW4	SW5
29	V30002302	CNAS 6P/450 TB FLT W/C UL2468AWG24	PC	1,000	PL1	.	.	.	.
30	V30019674	LED RED ORANGE 5MM ULTRA BRIGHT	PC	2,000	LD1	LD2	.	.	.
31	V40000084	BRACKET & PREAMPLIFIER	PC	1,000	IC1	.	.	.	.
36	V30000526	RES CF 1/4W 1.5K J	PC	1,000	R2	.	.	.	.
37	V30000622	RES CF 1/4W 270R J	PC	1,000	R5	.	.	.	.
38	V30000689	RES CF 1/4W 3.9K J	PC	1,000	R1	.	.	.	.
39	V30000712	RES CF 1/4W 470R J	PC	1,000	R4	.	.	.	.
40	V30000718	RES CF 1/4W 4.7K J	PC	1,000	R6	.	.	.	.
41	V30000770	RES CF 1/4W 680R J	PC	1,000	R3	.	.	.	.
43	V30022893	PCB 11TK127-6	PC	1,000	.	.	.	.	.
44	V30000371	CAP EL 22UF 50V M	PC	1,000	C1	.	.	.	.
45	V30001455	TR BC558B	PC	1,000	Q1	.	.	.	.
46	V20103947	CRT B.ASSY.TP33D AK37	PC	1,000	.	.	.	.	.
48	V20104295	HE.ASY.37-CRT BOARD TP33D (AK33/37)	PC	1,000	IC900	.	.	.	.
49	V30008721	IC TDA6108	PC	1,000	.	.	.	.	.
50	V35000158	NUT C ZN BOTTOM M3	PC	1,000	.	.	.	.	.
51	V35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	.	.	.	.	.
52	V35000189	SCREW C NI YSMB M3*6	PC	1,000	.	.	.	.	.
53	V35005171	HEATSINK AK30A-CRT BOARD	PC	1,000	.	.	.	.	.
54	V30000074	CAP MKT 100NF 63V J	PC	1,000	R923	.	.	.	.
55	V30000075	CAP MKT 100NF 250V K (DC)	PC	2,000	C900	C907	.	.	.
56	V30000350	CAP EL 10UF 250V M	PC	1,000	C906	.	.	.	.
57	V30000415	CAP EL 4.7UF 250V M	PC	1,000	C902	.	.	.	.
58	V30000428	SPARK GAP 300V	PC	1,000	D910	.	.	.	.
59	V30001084	RES MO 1W 1K J	PC	1,000	R914	.	.	.	.
60	V30001170	RES MO 1W 4.7K J	PC	1,000	R916	.	.	.	.
61	V30001208	RES FUSE 1W 10R J	PC	1,000	R917	.	.	.	.
62	V30001850	CONN HEADER 6P 2.5MM TOP WHT SD	PC	1,000	PL903	.	.	.	.
63	V30001855	SOCKET CRT NARROWNECK W/GND	PC	1,000	PL900	.	.	.	.
65	V30006709	CONN HEADER 5P 2.5MM TOP WHT SD	PC	1,000	PL902	.	.	.	.
66	V30015122	CNAS 5P-6/500 TUB SIS W/DC UL1007AWG24	PC	1,000	PL903	.	.	.	.
67	V30018922	CNAS 5P/500+1P/500 SIS W/4C UL1007AWG24	PC	1,000	PL902	.	.	.	.
68	V35000135	TEST PIN 1.1MM	PC	2,000	PL905	PL908	.	.	.
74	V20112552	CRT B.ASSY.TP33D-PER AK37	PC	1,000	.	.	.	.	.
75	V35000176	EYELET BR 2*3MM	PC	3,000	PL905	PL906	PL907	.	.
77	V30000428	SPARK GAP 300V	PC	4,000	SG901	SG902	SG903	SG904	.
78	V30000459	RES CF 1/4W 100R J	PC	3,000	R902	R903	R904	.	.
79	V30000471	RES CF 1/4W 10K J	PC	1,000	R918	.	.	.	.
80	V30000477	RES CF 1/4W 100K J	PC	3,000	R907	R908	R912	.	.
81	V30000525	RES CF 1/2W 1.5K J	PC	4,000	R909	R910	R911	R913	.
82	V30000535	RES CF 1/2W 150K J	PC	1,000	R906	.	.	.	.
83	V30000590	RES CF 1/4W 2.2K J	PC	1,000	R920	.	.	.	.
84	V30000599	RES CF 1/4W 220K J	PC	1,000	R919	.	.	.	.
85	V30000718	RES CF 1/4W 4.7K J	PC	1,000	R924	.	.	.	.
86	V30000788	RES CF 1/4W 6.8M J	PC	1,000	R900	.	.	.	.
87	V30001284	DIODE 1N4148 0.15A/100V 0.5A	PC	7,000	D911	D912	D913	D905	D906
.	.	.	.	.	D907	D908	.	.	.
88	V30001318	DIODE BA159 1A/800V 20A	PC	4,000	D902	D901	D903	D904	.
89	V30001329	DIODE 1N4007 1A/1000V 30A	PC	1,000	D914	.	.	.	.
90	V30018870	PCB 11TP33D-3	PC	1,000	.	.	.	.	.
91	V30000234	CAP CER 270PF 50V J SL	PC	1,000	C905	.	.	.	.
92	V30000295	CAP CER 100NF 50V Z F	PC	1,000	C904	.	.	.	.
93	V30000376	CAP EL 220UF 25V M	PC	1,000	C912	.	.	.	.
94	V30000385	CAP EL 2.2UF 250V M	PC	1,000	C909	.	.	.	.
95	V30000433	CAP CER 1NF 1KV M B	PC	1,000	C911	.	.	.	.
96	V30000438	CAP CER 2.2NF 2KV	PC	1,000	C903	.	.	.	.
97	V30001427	TR BF422	PC	1,000	Q900	.	.	.	.
98	V30001454	TR BC548B	PC	1,000	Q901	.	.	.	.
99	V30001455	TR BC558B	PC	1,000	Q902	.	.	.	.
100	V20106004	CHS.ASSY.37-31651114222211912W	PC	1,000	.	.	.	.	.
104	V30001830	CONN HEADER 2P 2.5MM TOP BLUE SD	PC	1,000	PL102	.	.	.	.
105	V30001839	CONN HEADER 3P 2.5MM TOP GREEN SD	PC	1,000	PL103	.	.	.	.
106	V30010921	DOUBLE-DECK SCART SOCKET	PC	1,000	PL101	.	.	.	.
107	V30015284	JACK RCA 3P AK3X LONG	PC	1,000	JK101	.	.	.	.
109	V30001518	IC TDA1308	PC	1,000	IC702	.	.	.	.
110	V30001836	CONN HEADER 3P 2.5MM TOP BLACK SD	PC	1,000	PL700	.	.	.	.
112	V30015592	XTAL 3.579545 (WO/LOAD CAP)	PC	1,000	X402	.	.	.	.
114	V30013163	FILTER SAW K9356	PC	1,000	Z401	.	.	.	.

BILL OF MATERIAL LIST

10016298 2841 TOSHIBA TOSHIBA 28N33B(AK37)SILVER

NO	PART NUMBER	DESCRIPTION	UNIT	QTY	POSITION NUMBER
115	V30014261	FILTER SAW K3958M	PC	1,000	Z402
116	V30014521	IC STV2247 (SHRINK56)	PC	1,000	IC403
118	V30001756	XTAL 18.432MHZ	PC	1,000	X700
120	V30013658	IC MSP3410G SDIP64	PC	1,000	IC700
122	V30001123	RES MO 2W 220R J	PC	1,000	R609
123	V30001270	PTC 9 OHM	PC	1,000	TH800
125	V30008856	RES MO 2W 270R J	PC	1,000	R682
127	V30017843	IC ST92195C 64K TOS37B28	PC	1,000	IC501
129	V20094516	CHASSIS FRAME AK37 (I) V.0	PC	1,000	
130	V20094517	PCB GUIDE RAIL (HIGH BIG) (I) V.0	PC	2,000	
131	V60000009	FR-HIPS NATR.V-0	KG	0,007	
132	V60000022	MASTERBATCH (BLACK)	G	0,035	
133	V60000009	FR-HIPS NATR.V-0	KG	0,259	
134	V35005061	SCREW RB C SK ZN YFMB 2.9*9.5	PC	4,000	
136	V20070599	HE.ASY.37-HORIZANTAL	PC	1,000	
137	V30001441	TR BU2508AF	PC	1,000	Q601
138	V35000158	NUT C ZN BOTTOM M3	PC	1,000	
139	V35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	
140	V35000181	SCREW C ZN YSMB M3*8	PC	1,000	
141	V35004133	HEATSINK HORIZONTAL AK37	PC	1,000	
142	V20070601	HE.ASY.37-2*5V & 8V REG	PC	1,000	
143	V30001500	IC LM7808	PC	1,000	IC803
144	V30001622	IC 7805 (1A)	PC	2,000	IC804 IC802
145	V35000158	NUT C ZN BOTTOM M3	PC	3,000	
146	V35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	3,000	
147	V35000181	SCREW C ZN YSMB M3*8	PC	3,000	
148	V35004381	HEATSINK REGULATOR AK37	PC	1,000	
149	V20092405	CN.ASY.37-DIODE UF5407+FERRITE BAR 5*8	PC	1,000	D808
150	V30001964	FERRITE BAR 5*8	PC	1,000	
151	V30007681	DIODE UF5407 3A/800V 150A	PC	1,000	
152	V20108354	DIODE BRIDGE GBU4M 4A/1000V 150A(FORMLU)	PC	1,000	D891
153	V30007758	DIODE BRIDGE GBU4M 4A/1000V 150A	PC	1,000	
154	V20112074	HE.ASY.37-AUDIO&EAST-WEST W/CA.HOL(T/J/H	PC	1,000	
155	V30001429	TR BUK444-200A	PC	1,000	Q602
156	V30016113	IC AAMP TDA7269A 2*14W MULTIWATT11	PC	1,000	IC301
157	V35000158	NUT C ZN BOTTOM M3	PC	1,000	
158	V35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	
159	V35000181	SCREW C ZN YSMB M3*8	PC	1,000	
160	V35004971	AUDIO & EAST-WEST (AK37)	PC	1,000	
161	V40011922	EDGE SADDLE (CT-16)	PC	2,000	
162	V20112075	HE.ASY.37-VERTICAL W/CABLE HOLDER(T/J/H)	PC	1,000	
163	V30013985	IC STV9306	PC	1,000	IC601
164	V35000158	NUT C ZN BOTTOM M3	PC	1,000	
165	V35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	
166	V35000181	SCREW C ZN YSMB M3*8	PC	1,000	
167	V35004132	HEATSINK VERTICAL AK37	PC	1,000	
168	V40011922	EDGE SADDLE (CT-16)	PC	1,000	
169	V30000094	CAP MKT 220NF 275V M AC	PC	2,000	C801 C802
170	V30000161	CAP MKP 47NF 630V J	PC	1,000	C811
171	V30000356	CAP EL 100UF 63V M	PC	1,000	C604
172	V30000360	CAP EL 1000UF 25V M	PC	1,000	C605
173	V30000383	CAP EL 2200UF 25V M	PC	2,000	C850 C830
174	V30000406	CAP EL 47UF 250V M (HR) 105°	PC	2,000	C826 C623
175	V30000409	CAP EL 470UF 25V M	PC	1,000	C644
176	V30000411	CAP EL 4700UF 16V M	PC	1,000	C827
177	V30000440	CAP CER 2.2NF 4KV M	PC	1,000	C816
179	V30001320	DIODE GUC BY228	PC	1,000	D605
180	V30001749	XTAL 4.433619 MHZ (AK15)	PC	1,000	X401
181	V30001762	CONN HEADER 2P 2.5MM(9.7MM) TOP	PC	1,000	PL301
182	V30001764	CONN HEADER 2P 2.5MM(9.7MM) TOP BLACK	PC	1,000	PL302
183	V30001770	CONN HEADER 3P 2.5MM TOP BD	PC	1,000	PL512
184	V30001783	CONN HEADER 5P 2.5MM TOP BD	PC	1,000	PL502
185	V30001784	CONN HEADER 6P 2.5MM TOP BD	PC	1,000	PL509
186	V30001792	CONN HEADER 2P 7.5MM TOP WHT	PC	2,000	PL801 PL601
187	V30001795	CONN HEADER 3P 5/7.5MM TOP WHT	PC	1,000	PL802
188	V30001829	CONN HEADER 2P 2.5MM TOP WHT SD	PC	1,000	PL602
189	V30001850	CONN HEADER 6P 2.5MM TOP WHT SD	PC	1,000	PL600
191	V30002090	LINE DRIVER NEW TYPE	PC	1,000	TR600
192	V30002851	XTAL 4MHZ L.C=30PF	PC	1,000	X501
193	V30007748	CAP EL 1000UF 35V M	PC	1,000	C647
195	V30009366	DIODE UF5402 3A/200V 150A	PC	2,000	D810 D811
196	V30011968	IC SMPS MC44608 DIP8	PC	1,000	IC800
197	V30014048	ADJ.COIL VIF 44MHZ Q=64 C=39pF	PC	1,000	L405
198	V30015087	IC OPTOCOUPLER TCET1102G	PC	1,000	IC801
200	V35000135	TEST PIN 1.1MM	PC	1,000	PL804
201	V70000029	SOLDER (INGOT) 63/37	KG	0,019	
202	V70000030	SOLDER WIRE CAP 1.00mm 60Sn40Pb	G	0,690	
203	V70000661	SILICON V0 (UL 1410)(Firma Catg.No3748	G	6,000	
205	V20000848	FUSE ASSY.TK79-A (2.5A)	PC	1,000	F801
206	V30001731	FUSE 2.5A 250V 5*20MM	PC	1,000	
207	V35000136	FUSE HOLDER TK79-A (GRAY)	PC	1,000	
208	V20112076	HE.ASY.37-SMPS 170-270V W/CAB.HOL.(T/J/H	PC	1,000	
209	V30001386	TR MTP6N60E (PLASTIC)	PC	1,000	Q802
210	V35000158	NUT C ZN BOTTOM M3	PC	1,000	
211	V35000165	KNURL WASHER C ZNSY 3*6*04 (M3)	PC	1,000	
212	V35000181	SCREW C ZN YSMB M3*8	PC	1,000	
213	V35006413	HEATSINK SMPS AK45	PC	1,000	
214	V40011922	EDGE SADDLE (CT-16)	PC	1,000	
215	V70000074	SILICON (GRES)	KG	0,010	
216	V30000161	CAP MKP 47NF 630V J	PC	1,000	C860
217	V30000420	CAP EL 150UF 400V M	PC	1,000	C809
218	V30000440	CAP CER 2.2NF 4KV M	PC	1,000	C852
219	V30001792	CONN HEADER 2P 7.5MM TOP WHT	PC	1,000	PL803
220	V30018785	TRF SMPS AK37 110° (170-270V) VER2	PC	1,000	TR802
221	V30018866	LINE FILTER 2X22MH 10mmX12.5mm	PC	1,000	TR801

BILL OF MATERIAL LIST

10016298 2841 TOSHIBA TOSHIBA 28N33B(AK37)SILVER

NO	PART NUMBER	DESCRIPTION	UNIT	QTY	POSITION NUMBER				
223	V30009637	TUNER WSP (PLL) 38.9 MK2 - BATCH	PC	1,000	TU201	.	.	.	.
224	V20102309	IC 24C08 T35392110A101211051(TOSHIBA)	PC	1,000	.	.	.	.	.
225	V30006987	IC 24C08 (WP)	PC	1,000	.	.	.	.	.
232	V30000459	RES CF 1/4W 100R J	PC	2,000	R204	R206	.	.	.
233	V30000594	RES CF 1/4W 22K J	PC	1,000	R568	.	.	.	.
234	V30000295	CAP CER 100NF 50V Z F	PC	1,000	C246	.	.	.	.
235	V30000345	CAP EL 10UF 50V M	PC	1,000	C547	.	.	.	.
243	V30000466	RES CF 1/4W 1K J	PC	1,000	R137	.	.	.	.
244	V30000519	RES CF 1/4W 150R J	PC	1,000	R158	.	.	.	.
245	V30000723	RES CF 1/4W 47K J	PC	1,000	R154	.	.	.	.
246	V30000752	RES CF 1/4W 56K J	PC	1,000	R152	.	.	.	.
247	V30000792	RES CF 1/4W 75R J	PC	3,000	R117	R123	R173	.	.
248	V30000100	CAP MKT 330NF 63V J	PC	6,000	C714	C716	C717	C718	C721
.	.	.	.	.	C723	.	.	.	.
249	V30000109	CAP MKT 470NF 63V J	PC	2,000	C436	C442	.	.	.
250	V30000345	CAP EL 10UF 50V M	PC	2,000	C160	C161	.	.	.
251	V30000384	CAP EL 2.2UF 50V M	PC	4,000	C737	C738	C739	C740	.
252	V30007081	CAP EL 4.7UF 50V M (NPL)	PC	2,000	C141	C142	.	.	.
253	V30001457	TR BC848B SMD	PC	5,000	Q104	Q106	Q142	Q143	Q141
254	V30001971	FERRITE BEAT (805) BLM21A601S	PC	15,000	L101	L102	L106	L108	L109
.	.	.	.	.	L115	L112	L113	L110	L111
.	.	.	.	.	L119	L116	L117	L114	L118
255	V30007760	DIODE ZENER SMD BZT55C10	PC	2,000	D101	D104	.	.	.
256	V30007760	DIODE ZENER SMD BZT55C10	PC	3,000	D105	D106	D107	.	.
257	V30012508	RES SMD 1/16W 1.8K J (0603)	PC	1,000	C164	.	.	.	.
258	V30012510	RES SMD 1/16W 100R J (0603)	PC	4,000	R721	R722	R723	R724	.
259	V30012560	CAP SMD 100PF 50V J (0603)	PC	4,000	C155	C156	C157	C158	.
260	V30012573	CAP SMD 47PF 50V J (0603)	PC	1,000	C162	.	.	.	.
261	V30012589	CAP SMD 4.7NF 50V K (0603)	PC	6,000	C143	C144	C145	C147	C148
.	.	.	.	.	C150	.	.	.	.
262	V30012644	RES SMD 1/16W 12K J (0603)	PC	2,000	R533	R540	.	.	.
263	V30012649	RES SMD 1/16W 150R J (0603)	PC	6,000	R155	R121	R124	R107	R111
.	.	.	.	.	R150	.	.	.	.
264	V30012657	RES SMD 1/16W 1K J (0603)	PC	8,000	R102	R103	R138	R135	R153
.	.	.	.	.	R165	R141	R126	.	.
265	V30012659	RES SMD 1/16W 2.2K J (0603)	PC	3,000	R539	R532	R172	.	.
266	V30012696	RES SMD 1/16W 47K J (0603)	PC	1,000	R151	.	.	.	.
267	V30012703	RES SMD 1/16W 56K J (0603)	PC	1,000	R149	.	.	.	.
268	V30012713	RES SMD 1/16W 75R J (0603)	PC	11,000	R106	R109	R110	R113	R114
.	.	.	.	.	R115	R139	R129	R118	R171
.	.	.	.	.	R174	.	.	.	.
270	V30016654	CAP SMD 100NF 16V K R (0603)	PC	2,000	C514	C526	.	.	.
271	V30018735	DIODE ZENER BZT55C15 15V SMD	PC	1,000	D108	.	.	.	.
276	V30000471	RES CF 1/4W 10K J	PC	1,000	R704	.	.	.	.
277	V30000345	CAP EL 10UF 50V M	PC	1,000	C725	.	.	.	.
278	V30000352	CAP EL 100UF 16V M	PC	2,000	C715	C722	.	.	.
279	V30000362	CAP EL 1UF 50V M	PC	3,000	C711	C731	C732	.	.
280	V30001971	FERRITE BEAT (805) BLM21A601S	PC	2,000	L705	L706	.	.	.
281	V30012506	RES SMD 1/16W 1.5K J (0603)	PC	2,000	R709	R716	.	.	.
282	V30012585	CAP SMD 2.2NF 50V K R (0603)	PC	2,000	C747	C748	.	.	.
283	V30012587	CAP SMD 3.3NF 50V K (0603)	PC	2,000	C743	C744	.	.	.
284	V30012641	RES SMD 1/16W 10K J (0603)	PC	3,000	R702	R706	R713	.	.
285	V30016654	CAP SMD 100NF 16V K R (0603)	PC	1,000	C728	.	.	.	.
292	V30012566	CAP SMD 22PF 50V J (0603)	PC	1,000	C457	.	.	.	.
293	V30012589	CAP SMD 4.7NF 50V K (0603)	PC	2,000	C741	C742	.	.	.
301	V30000459	RES CF 1/4W 100R J	PC	3,000	R701	R703	R705	.	.
302	V30001369	DIODE ZENER 3.6V ZPD	PC	1,000	D701	.	.	.	.
303	V30001992	FIXED COIL 10UH Q65 K-A	PC	1,000	L702	.	.	.	.
304	V30000190	CAP CER 100PF 50V J CH	PC	1,000	C404	.	.	.	.
305	V30000345	CAP EL 10UF 50V M	PC	8,000	C705	C706	C712	C720	C724
.	.	.	.	.	C733	C734	C736	.	.
306	V30000392	CAP EL 0.33UF 50V M	PC	2,000	C333	C363	.	.	.
307	V30000393	CAP EL 3.3UF 50V M	PC	1,000	C730	.	.	.	.
308	V30001285	DIODE 1N4148 SMD	PC	1,000	D700	.	.	.	.
309	V30001458	TR BC858B SMD	PC	1,000	Q700	.	.	.	.
310	V30001971	FERRITE BEAT (805) BLM21A601S	PC	4,000	L700	L701	L703	L704	.
311	V30012565	CAP SMD 1.8PF 50V J CH (0603)	PC	2,000	C700	C701	.	.	.
312	V30012576	CAP SMD 56PF 50V J CH (0603)	PC	3,000	C704	C702	C703	.	.
313	V30012641	RES SMD 1/16W 10K J (0603)	PC	2,000	R332	R338	.	.	.
314	V30012649	RES SMD 1/16W 150R J (0603)	PC	1,000	R700	.	.	.	.
315	V30012657	RES SMD 1/16W 1K J (0603)	PC	1,000	R719	.	.	.	.
316	V30012669	RES SMD 1/16W 22K J (0603)	PC	2,000	R371	R370	.	.	.
317	V30012702	RES SMD 1/16W 560R J (0603)	PC	2,000	R333	R341	.	.	.
318	V30012702	RES SMD 1/16W 560R J (0603)	PC	2,000	R715	R717	.	.	.
319	V30016654	CAP SMD 100NF 16V K R (0603)	PC	6,000	C708	C713	C719	C729	C735
.	.	.	.	.	C745	.	.	.	.
321	V30016654	CAP SMD 100NF 16V K R (0603)	PC	1,000	C430	.	.	.	.
327	V30012560	CAP SMD 100PF 50V J (0603)	PC	1,000	C459	.	.	.	.
335	V30000459	RES CF 1/4W 100R J	PC	4,000	R513	R514	R603	R855	.
336	V30000466	RES CF 1/4W 1K J	PC	10,000	R420	R437	R438	R442	R507
.	.	.	.	.	R647	R813	R690	R814	R481
337	V30000471	RES CF 1/4W 10K J	PC	3,000	R518	R606	R639	.	.
338	V30000477	RES CF 1/4W 100K J	PC	1,000	R680	.	.	.	.
339	V30000495	RES CF 1/4W 1.2K J	PC	1,000	R512	.	.	.	.
340	V30000526	RES CF 1/4W 1.5K J	PC	2,000	R819	R839	.	.	.
341	V30000530	RES CF 1/2W 15K J	PC	2,000	R828	R829	.	.	.
342	V30000554	RES CF 1/4W 180R J	PC	1,000	R607	.	.	.	.
343	V30000572	RES CF 1/4W 2K J	PC	1,000	R617	.	.	.	.
344	V30000599	RES CF 1/4W 220K J	PC	1,000	R610	.	.	.	.
345	V30000628	RES CF 1/4W 2.7K J	PC	3,000	R469	R640	R534	.	.
346	V30000633	RES CF 1/4W 27K J	PC	1,000	R634	.	.	.	.
347	V30000650	RES CF 1/4W 33R J	PC	2,000	R805	R852	.	.	.
348	V30000670	RES CF 1/4W 330K J	PC	2,000	R467	R468	.	.	.
349	V30000689	RES CF 1/4W 3.9K J	PC	1,000	R694	.	.	.	.
350	V30000718	RES CF 1/4W 4.7K J	PC	3,000	R811	R851	R801	.	.

BILL OF MATERIAL LIST

10016298 2841 TOSHIBA TOSHIBA 28N33B(AK37)SILVER

NO	PART NUMBER	DESCRIPTION	UNIT	QTY	POSITION NUMBER				
351	V30000792	RES CF 1/4W 75R J	PC	1,000	R122	.	.	.	.
352	V30000859	RES MF 1/2W 1R F	PC	1,000	R608	.	.	.	.
353	V30000982	RES MF 1/4W 4.7K J	PC	1,000	R806	.	.	.	.
354	V30001228	RES FUSE 1/2W 2.2R J	PC	1,000	R657	.	.	.	.
355	V30001257	RES MG 1/2W 4.7M J	PC	1,000	R810	.	.	.	.
356	V30001284	DIODE 1N4148 0.15A/100V 0.5A	PC	3,000	D506	D407	D409	.	.
357	V30001315	DIODE BYD33D 1A/200V 20A	PC	3,000	D803	D805	D806	.	.
358	V30001318	DIODE BA159 1A/800V 20A	PC	6,000	D609	D610	D613	D802	D800
.	.	.	.	.	D617	.	.	.	.
359	V30001329	DIODE 1N4007 1A/1000V 30A	PC	4,000	D601	D809	D303	D897	.
360	V30001350	DIODE ZENER 12V	PC	2,000	D659	D661	.	.	.
361	V30001369	DIODE ZENER 3.6V ZPD	PC	1,000	D513	.	.	.	.
362	V30001372	DIODE ZENER 9.1V ZPD	PC	1,000	D801	.	.	.	.
363	V30001377	DIODE ZENER 33V UZT 33B	PC	1,000	D533	.	.	.	.
364	V30001979	FIXED COIL 1UH Q45 M-A	PC	1,000	L201	.	.	.	.
365	V30001992	FIXED COIL 10UH Q65 K-A	PC	3,000	L402	L408	L803	.	.
366	V30003696	DIODE RGP15J	PC	1,000	D616	.	.	.	.
367	V30007308	CAP CER 220PF 1KV K (PULSE)	PC	1,000	C822	.	.	.	.
369	V30020900	PCB 11AK37-10	PC	1,000	.	.	.	.	.
370	V30000090	CAP MKT 22NF 100V J	PC	2,000	C645	C641	.	.	.
371	V30000100	CAP MKT 330NF 63V J	PC	5,000	C632	C640	C646	C420	C303
372	V30000107	CAP MKT 47NF 250V J	PC	2,000	C653	C542	.	.	.
373	V30000198	CAP CER 120PF 500V J SL	PC	1,000	C817	.	.	.	.
374	V30000295	CAP CER 100NF 50V Z F	PC	3,000	C536	C649	C440	.	.
375	V30000330	CAP CER 4.7NF 50V K B	PC	1,000	C652	.	.	.	.
376	V30000345	CAP EL 10UF 50V M	PC	11,000	C409	C411	C433	C544	C205
.	.	.	.	.	C513	C507	C527	C310	C455
.	.	.	.	.	C541	.	.	.	.
377	V30000352	CAP EL 100UF 16V M	PC	5,000	C424	C453	C159	C422	C423
378	V30000362	CAP EL 1UF 50V M	PC	5,000	C413	C416	C417	C431	C443
379	V30000384	CAP EL 2.2UF 50V M	PC	3,000	C410	C419	C444	.	.
380	V30000385	CAP EL 2.2UF 250V M	PC	1,000	C635	.	.	.	.
381	V30000387	CAP EL 33UF 50V M	PC	2,000	C810	C636	.	.	.
382	V30000400	CAP EL 47UF 50V M	PC	2,000	C502	C201	.	.	.
383	V30000407	CAP EL 470UF 16V M	PC	8,000	C642	C366	C838	C839	C840
.	.	.	.	.	C829	C833	C848	.	.
384	V30000413	CAP EL 4.7UF 50V M	PC	1,000	C165	.	.	.	.
385	V30000431	CAP CER 100PF 1KV M	PC	2,000	C543	C567	.	.	.
386	V30000433	CAP CER 1NF 1KV M B	PC	3,000	C803	C804	C877	.	.
387	V30001318	DIODE BA159 1A/800V 20A	PC	3,000	D804	D892	D893	.	.
388	V30001384	TR MCR22-6	PC	1,000	D889	.	.	.	.
389	V30001435	TR NBJT BC639 1A/100V TO92	PC	1,000	Q600	.	.	.	.
390	V30001454	TR BC548B	PC	1,000	Q804	.	.	.	.
391	V30001506	IC TL431	PC	1,000	IC818	.	.	.	.
392	V30007708	CAP CER 1NF 1KV K (PULSE)	PC	2,000	C858	C872	.	.	.
393	V30017319	CAP MKT 120NF 63V J	PC	1,000	C602	.	.	.	.
394	V30018380	CAP EL 3.3UF 160V M 105°	PC	1,000	C648	.	.	.	.
395	V30001285	DIODE 1N4148 SMD	PC	10,000	D501	D505	D512	D603	D812
.	.	.	.	.	D614	D408	D894	D651	D653
396	V30001457	TR BC848B SMD	PC	6,000	Q503	Q802	Q307	Q604	Q403
.	.	.	.	.	Q404	.	.	.	.
397	V30001458	TR BC858B SMD	PC	1,000	Q504	.	.	.	.
398	V30001458	TR BC858B SMD	PC	3,000	Q316	Q603	Q605	.	.
399	V30001971	FERRITE BEAT (805) BLM21A601S	PC	9,000	L210	L401	L403	L406	L215
.	.	.	.	.	L503	L504	L501	L502	.
400	V30007763	DIODE ZENER SMD BZT55C5V1	PC	3,000	D405	D657	D658	.	.
401	V30012506	RES SMD 1/16W 1.5K J (0603)	PC	1,000	R483	.	.	.	.
402	V30012509	RES SMD 1/16W 100K J (0603)	PC	2,000	R845	R681	.	.	.
403	V30012510	RES SMD 1/16W 100R J (0603)	PC	11,000	R417	R418	R604	R669	R670
.	.	.	.	.	R508	R428	R458	R849	R462
.	.	.	.	.	R425	.	.	.	.
404	V30012560	CAP SMD 100PF 50V J (0603)	PC	4,000	C519	C520	C449	C515	.
405	V30012562	CAP SMD 15PF 50V J (0603)	PC	2,000	C521	C522	.	.	.
406	V30012566	CAP SMD 22PF 50V J (0603)	PC	3,000	C524	C525	C511	.	.
407	V30012581	CAP SMD 1NF 50V K R (0603)	PC	2,000	C415	C607	.	.	.
408	V30012582	CAP SMD 10NF 50V K R (0603)	PC	1,000	C441	.	.	.	.
409	V30012585	CAP SMD 2.2NF 50V K R (0603)	PC	2,000	C414	C523	.	.	.
410	V30012586	CAP SMD 22NF 50V K (0603)	PC	2,000	C408	C448	.	.	.
411	V30012589	CAP SMD 4.7NF 50V K (0603)	PC	4,000	C429	C529	C530	C505	.
412	V30012590	CAP SMD 47NF 50V K (0603)	PC	4,000	C364	C368	C808	C305	.
413	V30012590	CAP SMD 47NF 50V K (0603)	PC	6,000	C832	C834	C828	C835	C851
.	.	.	.	.	C818	.	.	.	.
414	V30012607	CAP SMD 150PF 50V J (0603)	PC	1,000	C534	.	.	.	.
415	V30012610	CAP SMD 10NF 50V J (0603)	PC	2,000	C206	C207	.	.	.
416	V30012641	RES SMD 1/16W 10K J (0603)	PC	8,000	R509	R548	R812	R844	R537
.	.	.	.	.	R526	R573	R848	.	.
417	V30012642	RES SMD 1/16W 120K J (0603)	PC	1,000	R853	.	.	.	.
418	V30012644	RES SMD 1/16W 12K J (0603)	PC	2,000	R545	R340	.	.	.
419	V30012649	RES SMD 1/16W 150R J (0603)	PC	3,000	R419	R328	R525	.	.
420	V30012650	RES SMD 1/16W 15K J (0603)	PC	1,000	R421	.	.	.	.
421	V30012657	RES SMD 1/16W 1K J (0603)	PC	9,000	R439	R511	R556	R574	R482
.	.	.	.	.	R698	R485	R486	R487	.
422	V30012659	RES SMD 1/16W 2.2K J (0603)	PC	9,000	R555	R343	R422	R426	R449
.	.	.	.	.	R572	R803	R515	R516	.
423	V30012662	RES SMD 1/16W 2.7K J (0603)	PC	4,000	R674	R472	R836	R474	.
424	V30012667	RES SMD 1/16W 220K J (0603)	PC	1,000	R324	.	.	.	.
425	V30012668	RES SMD 1/16W 220R J (0603)	PC	3,000	R459	R460	R461	.	.
426	V30012669	RES SMD 1/16W 22K J (0603)	PC	1,000	R554	.	.	.	.
427	V30012674	RES SMD 1/16W 27K J (0603)	PC	6,000	R201	R427	R431	R662	R560
.	.	.	.	.	R441	.	.	.	.
428	V30012683	RES SMD 1/16W 330K J (0603)	PC	2,000	R448	R433	.	.	.
429	V30012692	RES SMD 1/16W 4.7K J (0603)	PC	6,000	R202	R517	R527	R561	R846
.	.	.	.	.	R329	.	.	.	.
430	V30012696	RES SMD 1/16W 47K J (0603)	PC	2,000	R391	R691	.	.	.
431	V30012698	RES SMD 1/16W 5.6K J (0603)	PC	5,000	R530	R529	R519	R538	R528

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NO	PART NUMBER	DESCRIPTION	UNIT	QTY	POSITION NUMBER				
432	V30012702	RES SMD 1/16W 560R J (0603)	PC	4,000	R650	R450	R430	R630	.
433	V30012703	RES SMD 1/16W 56K J (0603)	PC	2,000	R169	R176	.	.	.
434	V30012707	RES SMD 1/16W 680R J (0603)	PC	1,000	R432	.	.	.	.
435	V30012708	RES SMD 1/16W 68K J (0603)	PC	2,000	R611	R693	.	.	.
436	V30012712	RES SMD 1/16W 8.2K J (0603)	PC	1,000	R423	.	.	.	.
437	V30012713	RES SMD 1/16W 75R J (0603)	PC	2,000	R145	R175	.	.	.
438	V30012714	RES SMD 1/16W 820R J (0603)	PC	3,000	R446	R447	R440	.	.
440	V30014022	RES SMD 1/16W 47R J (0603)	PC	2,000	R471	R678	.	.	.
441	V30014076	RES SMD 1/16W 4.7R J (0603)	PC	2,000	R319	R320	.	.	.
442	V30014128	RES SMD 1/16W 33R J (0603)	PC	2,000	R842	R847	.	.	.
443	V30016654	CAP SMD 100NF 16V K R (0603)	PC	19,000	C230	C427	C434	C435	C437
.	.	.	.	.	C438	C501	C510	C518	C532
.	.	.	.	.	C439	C412	C418	C425	C432
.	.	.	.	.	C504	C517	C565	C566	.
444	V30018526	DIODE ZENER BZT55C6V8 6.8V SMD	PC	1,000	D413	.	.	.	.
445	V30018735	DIODE ZENER BZT55C15 15V SMD	PC	1,000	D109	.	.	.	.
446	V70000067	GLUE SMD PANASONIC	G	0,037	.	.	.	.	.
453	V30000712	RES CF 1/4W 470R J	PC	1,000	R697	.	.	.	.
454	V30000718	RES CF 1/4W 4.7K J	PC	1,000	R689	.	.	.	.
455	V30000815	RES CF 1/4W 8.2K J	PC	1,000	R666	.	.	.	.
456	V30000851	RES MF 1/4W 100K J	PC	1,000	R817	.	.	.	.
457	V30007763	DIODE ZENER SMD BZT55C5V1	PC	1,000	D656	.	.	.	.
458	V30012506	RES SMD 1/16W 1.5K J (0603)	PC	1,000	R818	.	.	.	.
459	V30012509	RES SMD 1/16W 100K J (0603)	PC	1,000	R614	.	.	.	.
460	V30012669	RES SMD 1/16W 22K J (0603)	PC	1,000	R616	.	.	.	.
461	V30012685	RES SMD 1/16W 33K J (0603)	PC	1,000	R699	.	.	.	.
467	V30001159	RES MO 1W 0.33R J	PC	1,000	R834	.	.	.	.
468	V30001173	RES MO 1W 0.47R J	PC	1,000	R807	.	.	.	.
469	V30000074	CAP MKT 100NF 63V J	PC	1,000	C857	.	.	.	.
470	V30007708	CAP CER 1NF 1KV K (PULSE)	PC	1,000	C812	.	.	.	.
471	V30009208	CAP CER 470PF 1KV K (PULSE)	PC	1,000	C859	.	.	.	.
472	V30012694	RES SMD 1/16W 470K J (0603)	PC	1,000	R856	.	.	.	.
474	V30012649	RES SMD 1/16W 150R J (0603)	PC	1,000	R510	.	.	.	.
476	V30009036	RES FUSE 1/2W 0.1R J	PC	1,000	R656	.	.	.	.
480	V30009036	RES FUSE 1/2W 0.1R J	PC	1,000	R675	.	.	.	.
482	V30001285	DIODE 1N4148 SMD	PC	1,000	D655	.	.	.	.
483	V30012504	RES SMD 1/16W 1.2K J (0603)	PC	1,000	R651	.	.	.	.
484	V30012694	RES SMD 1/16W 470K J (0603)	PC	1,000	R692	.	.	.	.
485	V30012715	RES SMD 1/16W 82K J (0603)	PC	1,000	R671	.	.	.	.
486	V30014467	RES SMD 1/16W 680K J (0603)	PC	1,000	R672	.	.	.	.
487	V20118365	CRT DIFF.KIT AK37-28"THO L.F SJ T-H(150V	PC	1,000	PL602	.	.	.	.
488	V20114894	CN.ASY.RES FUSE 2W 1.2R J SERIES	PC	1,000	R648	.	.	.	.
489	V30001217	RES FUSE 2W 1.2R J	PC	2,000	.	.	.	.	.
490	V30000121	CAP KP 27NF 630V J	PC	1,000	C622	.	.	.	.
491	V30000156	CAP MKP 430NF 250V J	PC	1,000	C627	.	.	.	.
492	V30000177	CAP MKP 820NF 250V J	PC	2,000	C629	C625	.	.	.
493	V30000179	CAP MKP 9.1NF 1600V %3.5	PC	1,000	C621	.	.	.	.
494	V30000560	RES CF 1/4W 1.8K J	PC	1,000	R695	.	.	.	.
495	V30000734	RES CF 1/4W 4.7R J	PC	1,000	R668	.	.	.	.
496	V30000775	RES CF 1/4W 6.8K J	PC	1,000	R646	.	.	.	.
497	V30001150	RES MO 2W 330R J	PC	1,000	R677	.	.	.	.
498	V30001323	DIODE BY299 2A/800V 70A	PC	1,000	D606	.	.	.	.
499	V30002031	FIXED COIL INJECTION 15MH	PC	1,000	L600	.	.	.	.
500	V30002156	LINEARITY COIL 30UH 110' (AK19)	PC	1,000	L602	.	.	.	.
501	V30006709	CONN HEADER 5P 2.5MM TOP WHT SD	PC	1,000	PL405	.	.	.	.
502	V30016083	FIXED COIL 1MH AK33 HIGH CURRENT	PC	1,000	L603	.	.	.	.
503	V30018809	TRF FBT AK37 110° LAYER	PC	1,000	TR601	.	.	.	.
504	V30023448	CAP MKP 4.3NF 2KV J	PC	1,000	C618	.	.	.	.
505	V20106208	BUTTON AS.2841-2841W-3241W-2441W(SILVER)	PC	1,000	.	.	.	.	.
506	V20094341	LENS LED XX41 (I) MILKY	PC	1,000	.	.	.	.	.
507	V60000008	HIPS (NATURAL)	G	0,014	.	.	.	.	.
508	V60000927	CRYSTAL PS (NATURAL)	G	7,000	.	.	.	.	.
509	V20094352	LENS PRE-AMP XX41 (I)	PC	1,000	.	.	.	.	.
510	V60000927	CRYSTAL PS (NATURAL)	G	0,002	.	.	.	.	.
511	V20106209	BUTTON ON/OFF XX41 SILVER(P)	PC	1,000	.	.	.	.	.
512	V20106210	BUTTON ON/OFF XX41 EKO.GRAY(I)	PC	1,000	.	.	.	.	.
513	V60000001	ABS (NATURAL)	KG	0,005	.	.	.	.	.
514	V60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,026	.	.	.	.	.
515	V60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,002	.	.	.	.	.
516	V20106211	BUTTON FUNCTION XX41 SILVER(P)	PC	1,000	.	.	.	.	.
517	V20106222	BUTTON FUNCTION XX41 EKO.GRAY(I)	PC	1,000	.	.	.	.	.
518	V60000001	ABS (NATURAL)	KG	0,020	.	.	.	.	.
519	V60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,101	.	.	.	.	.
520	V60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,001	.	.	.	.	.
521	V20108360	BUTTON FUNCT.XX42/42W/43W/44W EKO.GR(I)#	PC	1,000	.	.	.	.	.
522	V60000001	ABS (NATURAL)	KG	0,018	.	.	.	.	.
523	V60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,090	.	.	.	.	.
524	V35000013	SPRING ON/OFF SWITCH	PC	1,000	.	.	.	.	.
525	V20106228	BACK CVR.2841/42/44 W/SB(UL)SILVER(P)4:3	PC	1,000	.	.	.	.	.
526	V20106227	BACK C.2841/42/44 W/SB(UL)EKO.GRAY(I)4:3	PC	1,000	.	.	.	.	.
527	V60000009	FR-HIPS NATR.V-0	KG	2,413	.	.	.	.	.
528	V60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	12,000	.	.	.	.	.
529	V60000895	PAINT SILVER 022-6485 (SU BAZLI)L8341413	KG	0,080	.	.	.	.	.
530	V20106229	SCR.AS.2841 W/SB/BAV (2SC)(AK37)(V0-GRAY	PC	1,000	.	.	.	.	.
531	V20098438	BACK DOOR AK37 EKO.GRAY (I) V.0	PC	1,000	.	.	.	.	.
532	V60000009	FR-HIPS NATR.V-0	KG	0,071	.	.	.	.	.
533	V60001195	MASTERBATCH EKO.GRAY GR 3216 SE1	G	0,720	.	.	.	.	.
534	V35000211	SCREW S C ZNSY YSMB 2.9*9.5	PC	4,000	.	.	.	.	.
535	V35000212	SCREW S C ZNSY YSMB 2.9*13	PC	2,000	.	.	.	.	.
536	V35000214	SCREW S C ZNSY YSMB 3.5*19	PC	1,000	.	.	.	.	.
537	V35000224	SCREW C SK ZN YFMB 2.9*9.5	PC	16,000	.	.	.	.	.
538	V35000231	SCREW SK C NI YFMB 2.9*6.5	PC	5,000	.	.	.	.	.
539	V35004572	SCREW P C AgSYF YSB 4x20	PC	10,000	.	.	.	.	.
540	V35006331	SCREW P C ZN AKBR 7*26	PC	4,000	.	.	.	.	.
541	V40000082	FOOT RUBBER 8410/11	PC	2,000	.	.	.	.	.

BILL OF MATERIAL LIST

10016298 2841 TOSHIBA TOSHIBA 28N33B(AK37)SILVER

NO	PART NUMBER	DESCRIPTION	UNIT	QTY	POSITION NUMBER				
542	V20107948	MD.ASY.SB103-FAV+HP XX41/W (AK37)	PC	1,000	.	.	.	.	.
545	V30001902	JACK HEADPHONE STEREO WO/SW	PC	1,000	JK108	.	.	.	.
546	V30013231	CNAS 3P/900 FLT W/C UL2468AWG24	PC	1,000	PL108	.	.	.	.
548	V30001830	CONN HEADER 2P 2.5MM TOP BLUE SD	PC	1,000	PL106	.	.	.	.
549	V30001839	CONN HEADER 3P 2.5MM TOP GREEN SD	PC	1,000	PL107	.	.	.	.
550	V30001891	RCA JACK 1P WHITE 28 FAV	PC	1,000	JK102	.	.	.	.
551	V30001892	RCA JACK 1P RED 28 FAV	PC	1,000	JK103	.	.	.	.
552	V30001893	RCA JACK 1P YELLOW 28 FAV	PC	1,000	JK101	.	.	.	.
553	V30002362	CNAS 830 FAV SHL W/4C+FER	PC	1,000	PL106, PL	.	.	.	.
560	V30000594	RES CF 1/4W 22K J	PC	2,000	R102	R104	.	.	.
561	V30000712	RES CF 1/4W 470R J	PC	2,000	R103	R106	.	.	.
562	V30001979	FIXED COIL 1UH Q45 M-A	PC	1,000	L101	.	.	.	.
563	V30019363	PCB 11SB103-2	PC	1,000	.	.	.	.	.
564	V30000190	CAP CER 100PF 50V J CH	PC	3,000	C101	C103	C104	.	.
568	V30000460	RES CF 1/4W 100R G	PC	2,000	R112	R113	.	.	.
569	V30000471	RES CF 1/4W 10K J	PC	2,000	R114	R115	.	.	.
570	V30001996	FIXED COIL 22UH Q40 K	PC	2,000	L103	L104	.	.	.
571	V30000290	CAP CER 10NF 50V Z F	PC	2,000	C105	C106	.	.	.
572	V20111922	CRT KIT (28") AK37 WO/UL W/PFC W/FERRIT	PC	1,000	.	.	.	.	.
573	V30002138	28 DEG COIL&EARTH CB.WO/UL FTZ	PC	1,000	.	.	.	.	.
574	V30016483	CNAS 2P/600 HRZ DIS W/C UL1672AWG24	PC	1,000	PL601	.	.	.	.
575	V30018898	CNAS 3P AK37 EMC	PC	1,000	PL512	.	.	.	.
576	V30019083	CNAS 2P/600 SIS W/C+FER UL1007AWG24	PC	1,000	PL602	.	.	.	.
577	V35000010	EARTH SPRING (4CM)	PC	1,000	.	.	.	.	.
578	V20111953	ARTWORK TOSH.TOSHIBA 28N33B(AK37)SILVER	PC	1,000	.	.	.	.	.
579	V20100980	R/C 2143 TOSHIBA CT-841(SILVER/P)(GRAY/S	PC	1,000	.	.	.	.	.
580	V20096229	R/C 2143 NOBRAND SILVER (F)	PC	1,000	.	.	.	.	.
581	V20094768	R/C KIT 2143 TOSHIBA	PC	1,000	.	.	.	.	.
582	V20094767	MD.ASY.UK05	PC	1,000	.	.	.	.	.
583	V20094766	UKV.B.ASSY.UK05 (SMD)	PC	1,000	.	.	.	.	.
584	V30000489	RES SMD 1/10W 1R J (0805)	PC	1,000	R102	.	.	.	.
585	V30012509	RES SMD 1/16W 100K J (0603)	PC	1,000	R103	.	.	.	.
586	V30012510	RES SMD 1/16W 100R J (0603)	PC	1,000	R100	.	.	.	.
587	V30012578	CAP SMD 68PF 50V J (0603)	PC	2,000	C101	C102	.	.	.
588	V30016654	CAP SMD 100NF 16V K R (0603)	PC	2,000	C103	C104	.	.	.
589	V30018063	IC HT48RA0A OTP	PC	1,000	IC101	.	.	.	.
590	V30018712	PCB 11UK05-2	PC	1,000	.	.	.	.	.
591	V30000352	CAP EL 100UF 16V M	PC	1,000	C100	.	.	.	.
592	V30001453	TR BC337	PC	1,000	Q100	.	.	.	.
593	V30002733	LED INFRARED IR333	PC	1,000	D100	.	.	.	.
594	V30002852	XTAL REZ 455KHZ	PC	1,000	X100	.	.	.	.
595	V35002401	BATTERY CONT.SINGLE (-) RC2040	PC	1,000	.	.	.	.	.
596	V35005008	BATTERY CONT.SINGLE (+) RC2040 TOSHIBA	PC	1,000	.	.	.	.	.
597	V35000228	SCREW SK C ZNSY YSMB 2.9*9.5	PC	1,000	.	.	.	.	.
598	V35005007	DOUBLE BATTERY CONTACT UKV-900 TOSHIBA	PC	1,000	.	.	.	.	.
599	V40005467	LENS RC2040(I)	PC	1,000	.	.	.	.	.
600	V40010082	RUBBER PAD TRP41 (RC 2143) TOSHIBA	PC	1,000	.	.	.	.	.
601	V40012344	SPONGE (BATTERY DOOR) (15x31x5mm)	PC	1,000	.	.	.	.	.
602	V40005299	BATTERY COVER RC2040 SILVER(P)	PC	1,000	.	.	.	.	.
603	V40009346	BOTTOM CVR R/C 21/2240 SILVER(P)	PC	1,000	.	.	.	.	.
604	V40010357	TOP CVR R/C 2143 NOBRAND (S) SILVER(P)	PC	1,000	.	.	.	.	.
605	V30002391	BATTERY AAA UM4 1.5V GREEN	PC	2,000	.	.	.	.	.
606	V50032101	I/B TOSHIBA 28N33B P/92195/2143/ENG	PC	1,000	.	.	.	.	.
607	V20111955	LBL.BCK.CVR.TOSHIBA TOSHIBA 28N33B "37	PC	1,000	.	.	.	.	.
608	V20013018	LBL.BCK.CVR.ASSY (TV) (WO/UL)	PC	1,000	.	.	.	.	.
609	V50023173	LABEL LOT W/BARCODE (77X256)	PC	1,050	.	.	.	.	.
610	V70000621	RIBBON 80MM*450MM	PC	1,030	.	.	.	.	.
611	V20111956	LBL.CART.BOX TOSHIBA 28N33B(ÇÝFT KATLI)	PC	1,000	.	.	.	.	.
612	V50023532	LABEL LOT TOSHIBA ÇÝFT KATLI	PC	1,050	.	.	.	.	.
613	V70000621	RIBBON 80MM*450MM	PC	1,050	.	.	.	.	.
614	V20114688	EXP.KIT AK37 284X-284XW (V.0) TOSHIBA	PC	1,000	.	.	.	.	.
615	V20004520	CABLE HOLDER DX15 (I)	PC	1,000	.	.	.	.	.
616	V60000991	KIRMA - HDPE	KG	0,003	.	.	.	.	.
617	V20084045	STRAP TIE (L:118)	PC	1,000	.	.	.	.	.
618	V60000018	COPOLYMER POLYPROPYLENE	KG	0,001	.	.	.	.	.
619	V20085269	CABLE HOLDER CRT (I) UL94V-0	PC	2,000	.	.	.	.	.
620	V60000855	KIRMA FR-ABS BLUE CRT	KG	0,002	.	.	.	.	.
621	V40006731	ISOLATION COTTON (9x25000mm)	M	1,800	.	.	.	.	.
622	V70000331	ADHESIVE TAPE 75MM/660M (4125)	M	2,592	.	.	.	.	.
623	V30002751	28" CPT TUBE 50 HZ FLAT IRON	PC	1,000	.	.	.	.	.
624	V40012621	LOGO TOSHIBA (W/P-SILVER BR/H.ST)(GRAY)	PC	1,000	.	.	.	.	.
625	V50000007	PLASTIZOTE (1400*1000)	PC	1,000	.	.	.	.	.

Cabinet Exploded View

N/A

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